# Maintain the Status Quo

THE demand for paper is improving.

The consumption of paper is increasing.

The outlook for materially increased mill operations for the next quarter seems assured.

From an analysis of the facts and figures relative to mill operations during the past six months and the conditions that obtained last year and up to the first of April this year, we believe that on April first the paper industry entered a most promising production and merchandising period.

We are predicating this forecast upon the maintenance and continuance of the improved conditions which the adoption of the codes have brought to the industry.

It seems to us but a foregone conclusion that the industry will maintain the improvement and advantages thus far gained. It is not only essential in theory that these improvements be sustained, but practical. After a careful contact made with various operating units in various divisions of the industry, the managements of a great majority of the paper producing units at last realize that they must consolidate every advantage gained and co-operate in sustaining the operating schedules on a basis of keeping paper production in balance with consumption. In this way alone can profits be ultimately secured.

The paper industry is fortunate in that under the code it has eliminated the deadly profit-killing practice of booking large tonnages for future delivery at cut-price figures.

The effects of this baneful practice, indulged in last year before the adoption of the codes, are still evident in the trade.

During the second quarter of 1933, the demand for paper was at low ebb. Jobber and converter warehouses were empty. Consumer shelves were bare of goods. Inventories were at the bottom.

However, every buyer and consumer of paper learned through the medium of the press that prices on all commodities were due for a drastic advance, which in turn, reflected a material increase in the paper price-level.

They immediately lodged orders with the mills. The mills, hungry for tonnage, booked large quantities for six, eight and even twelve months' delivery at the low price level then prevailing. After obtaining the orders, they ran at capacity operations and shipped out all that could be delivered and taken by the trade by the first of October. From October 1, 1933 to April 1, 1934—six months—the orders coming from the trade to the paper mills averaged 52 per cent of capacity in one big tonnage division of the industry, and the mills courageously adjusted their operations to that situation, and have maintained that adjustment without flinching.

During these six months, this excessive volume of paper in the hands of consumers, jobbers and converters has been moving into consumption until we come now to the first of April with a much improved stock situation and an increasing demand.

Naturally, there have been some misgivings as to whether the present price level would hold, but we believe the great majority of opinion is that the price levels will hold.

Newsprint prices cannot be slashed. Newsprint has been moving into the market at a material loss per ton to every newsprint producer. If anything, newsprint prices must advance to save a collapse of that division of the industry.

The price level for the enormous consumption of

wrapping paper must maintain. It cannot be cut. That division of the industry has the severest financial problems facing it. Behind every division of the industry stands the grim, stern form of Old Man Finance demanding that bank loans be paid up, that interest on defaulted bonds be forthcoming and that dividends invested in stocks of the paper mill companies be restored. Any unit cutting its price only hastens its footsteps into bankruptcy.

There is no question but that the situation is tight —tighter than it has ever been. The only solution we can see will be gained through the co-operation of every unit in the paper industry with every other unit in the maintenance of the present operating schedules and adjustments, and co-operation in the maintenance of those fair trade practices that alone will bring profit ultimately to our industry.

Maintain the *status quo!*

## The Silver Lining

THE years of prosperity immediately preceding the depression bred business bigotry, jealousy, suspicion, discontent, intrigue, and even hostility. Some situations, which developed, to say the least, were unsavory. Money talked.

Looking in retrospect upon the past three years, now that the paper industry seems definitely to have loosed itself from the shackles of depression and is well on the way to a profitable year again, the experience has not been for naught.

Some leaders and executives in our industry as well as others assumed exalted opinions of their individual importance. No doubt they thought that the business they were enjoying resulted entirely from their own genius and acumen rather than in part from an expanding market. In some cases, without question, marked success resulted even without diligent effort, and selfishness ran rampant.

The depression, like a lightning bolt, however, caused much of this wrong thinking to undergo a complete metamorphosis. It is true that it brought many discouragements and heartaches, but it also brought a rebirth of the spirit of brotherhood, a spirit of closer fellowship, and a tolerance for the viewpoint of others such as only a few years ago did not exist.

There is, at present, perhaps, more than ever before within our own industry, a more complete realization that progress results from co-operative efforts; that purely selfish motives do not generally lead to permanent good; and that competitors can work in complete harmony with one another to the benefit of the whole.

## Put Your Plant in Shape Now For Next Winter

ALTHOUGH plant maintenance should go on throughout the entire year, there are some jobs that are done only with difficulty during the winter season. Some of these jobs, perhaps, have been delayed in your own plant because of inclement weather.

With spring well under way and the summer season immediately before us, it seems that now is the time to recall to mind any of the jobs that you may have put off from doing because of cold weather and make plans to permit their accomplishment along with the regular program of plant changes. Maybe it is an exterior painting job to protect buildings or machinery that is located outside from the action of the weather, or the repairing of roadways and sidewalks that have broken up because of the cold, or the replacement of window panes in empty sashes, or the relocation of some water or steam line or even a conveyor that winter experiences have shown to be improperly located. Maybe the roofs of some of the buildings are now the worse for wear, an acid storage tank needs replacing, or the mill dam needs repairing. A thousand and one jobs of this kind might be enumerated, but a check of the conditions in your own plant will reveal what are the jobs to be done there.

In making your plans do not overlook any item because it seems small. Consider everything and then formulate a definite plan for the handling of each job. Do not put off any of the work that should be done, because the longer it is delayed the more unsatisfactory are the conditions to be met.

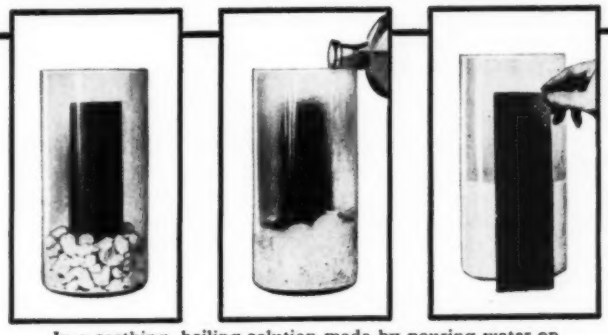
Make the most of the months ahead for putting your plant in best possible condition, so that when winter winds blow again they may not serve as reminders of work undone.

## Superintendents Go to Maine

IT IS not too early for those who are interested in the activities of the American Pulp and Paper Mill Superintendents Association to begin planning to attend the Fifteenth Annual Convention, which is scheduled for June 20 to 22, 1934, at Poland Spring, Maine, and will be the first national convention of this body to be held within that State.

This year superintendents have an unusual opportunity to combine business with pleasure in one of the country's most beautiful resorts, not far from which are located a number of mills that may be visited to learn how things are done in the State of Maine.

# 7 AMAZING TESTS PROVE YOU CAN CUT PAINT COSTS



In a seething, boiling solution made by pouring water on quick lime . . . panels coated with "Synthorized" paint stand 24 hours unaffected . . . the severest test for paint.

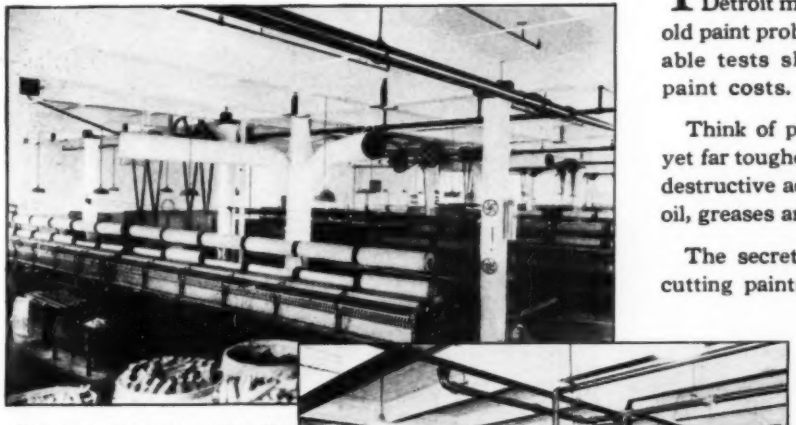
## No More Guesswork . . No More Ruined Jobs . No More Exorbitant Paint Bills . . . . . .

THROUGH the discovery of a nationally-known Detroit manufacturer a new kind of paint solves old paint problems in a new, better way. 7 remarkable tests show why this new-type paint cuts paint costs.

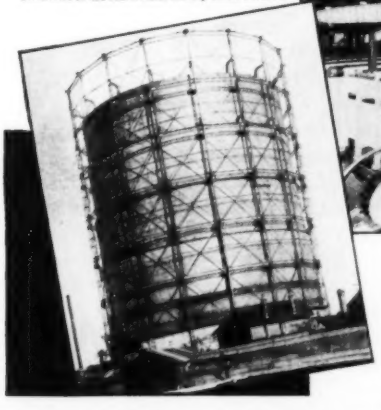
Think of paints that are not only quick-drying, yet far tougher, more flexible and proof against the destructive action of lime, acid, alkali, fumes, heat, oil, greases and excessive moisture!

The secret process by which these new cost-cutting paints are made is called "Synthorizing." Every paint buyer, every paint user, should get the facts about the sensational advantages of these new-type paints.

Degraco has now developed a remarkable new "Paint Chart" that shows when and where to use every type of paint—makes picking the right paint for any job astonishingly easy. The coupon brings it FREE . . . along with complete details of "Synthorized" paints.



"Synthorized" paints in textile mills give positive protection against chemical action and cut paint costs.



No more "dissolving" paint jobs in paper mills where "Synthorized" paints are used. Fewer repaintings. Lower paint costs.

●

A new "Synthorized" paint has been developed for gas holders especially to provide greater resistance to acid water, fumes and moisture. This paint is a money-saver for gas companies.

**DEGRACO PAINTS** VARNISHES ENAMELS

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**DETROIT GRAPHITE COMPANY**
**542 Twelfth St., Detroit, U. S. A.**

Please send me your FREE "Paint Chart," also facts about "Synthorized" paints.

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Address_____

City_____ State_____

# Is Machinery to Blame?

By WILLIAM SIBLEY

ONE of the most singular characteristics of the American people is the quick ability to blame something or somebody else when matters go badly. We don't like the business of standing up and taking our medicine. If we have to take it, and the medicine is bitter, we blame the doctor, or at least the apothecary. Blaming someone else seems to relieve the pain.

Just now it is thought we are emerging from a business depression, which was chiefly caused by the extravagant thinking and reckless spending of the American people at large. But did we admit that we, ourselves, were at fault; that we brought this depression upon ourselves? We did not. If we didn't blame the Republican administration, prohibition, installment buying, or lack of credit, we blamed it on overproduction. And overproduction, for the most of us, meant overmechanization.

Yes—that was it. Overproduction! Overmechanization! At last we found the culprit. All we need to do to get ourselves back to prosperous ways is to limit production. Everybody from President Roosevelt to the lowly barber-shop porter assured everyone else that we were producing more than we needed—more than we could consume. And so we must cut our productive capacity; limit the buying of machines; plow under cotton; kill little pigs; shut down entire plants.

Yet all the time overproduction was being pounced upon right and left, hundreds of thousands of people were cold for want of cotton clothing, hungry for want of pork chops, shivering for want of coal, and destitute for want of jobs.

But overmechanization (alias overproduction) *must* be the cause of our depression. Else why should there be passed by the House (and at this writing before the Senate) the Bankhead bill which would make it a criminal offense to grow more than the allotted amount of cotton? . . . Or why should a congressman address that august body from the floor of the House with these remarks? "Three men and a machine can harvest a crop of wheat which would formerly have required thirty men. The harvest hand is gone. The cotton picker is going. Cows are milked by machinery. Printing is a dying trade. Telephones are self-operative. Accounts are kept by machinery. The machinery is self-created. It digs its own materials out of the ground, transports them to the manufacturing plant, fabricates itself and operates itself. Every day in every way, on the farm, in the factory, in the mine, the need for human labor becomes less and less."

Truly a profound pronouncement. . . . Profoundly asinine! If that theory is correct, we should have had a constantly increasing degree of unemployment for the past one hundred years. Beginning with the saw-mill back in Old England, or with the steam boat which displaced oarsmen, we should have had an ever-mounting burden of unemployment. During the past century there has been a prodigious increase in the invention and adoption of labor-saving and labor-aiding machinery—more than had been produced throughout the preceding one thousand years. But the fact remains, that save for exceedingly temporary periods of depressions, we have employed constantly more and more people—at higher and higher wages—and for a greatly elevated standard of living.

The idea that labor-saving machinery makes a nation poorer and more susceptible to disastrous business depressions is a curious illusion. But it persists—because we want somebody, or something, to blame for the wrongs which we know are our own fault. It not only persists but the fallacy is crystallizing into hardened form. . . . In such forms as the various N R A codes which are designed, in part, to limit production. . . . In such statutes as the Bankhead bill, which, if passed and made to become a law, will be an act which perhaps more than any other single thing will promote bootlegging of cotton, encourage black mail and extortion, revive night-riding, and saturate the South with strife.

It is absolutely silly to think that three men and a machine do the work of thirty harvest hands in a North Dakota wheat field. It may seem so on the surface of things, but many of the displaced twenty-seven men are making electric motors, winding armatures, operating steam shovels, puddling steel, tending dry-kilns, casting grey-iron fittings, firing locomotives, dispatching trains, making adding machines, and countless other tasks—none of which were known, at any rate in equal size, in that backward day when it required thirty men to do the harvesting.

American prosperity, American progressiveness, American standards are founded on abundance. Not alone the abundance of raw materials, but the abundance of self-reliance and initiative which in turn make for abundance in manufactured articles. The policy of killing shoates, plowing cotton ready for the picking, or painting nutty pictures on the walls of post-offices in Thunder Hawk, South Dakota, is diametrically opposed to the All-American policy. Among the other industries which we may call truly American is the paper industry. Much of its immensity and value is founded on the fact that it too has been American in production. And if the paper industry is going to continue to progress—continue on its way back to enduring prosperity, it will discard every obsolete machine in favor of an improved one; it will divorce itself from every encumbering practice which can be replaced by greater efficiency. Only by so doing can it lower production costs, improve products, increase wages, enlarge buying power and so keep in motion the endless cycle of prosperity.

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THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

# Democratization of Capitalism

By R. A. STOUGH[1] and A. S. MacArthur[2]

TO epitomize our economic unsettledness simply as a depression is to miss the meaning and import of what likely will be one of the important pages in our national history. The depression by and of itself does not exist; it is a part of our past from which we created our present. We did it in the normal conduct of our daily behavior. It may be that our chief claim to a position among nations as a champion of a definite social and economic philosophy lies in the fact that we could have a past that could create such a present. We may have outdone ourselves, but we did stick to our creed.

Democracy and capitalism fit. Each may have its problems and defects, but they do cohere to make a national philosophy possible, and regardless of what the specific contributions of other nations to world disorganization may have been, ours undoubtedly was the democratization of capitalism.

### Evolution of Capitalistic Tools

Checks, bonds, mortgages, stocks, and other credit instruments that are such important devices of capitalism have in general been looked upon as rather snooty things. But not in our day. They have become the everyday capitalistic tools of a general population. One of the interesting aspects of this massive change in capitalism lies in the fact that its origin is found in an expression of national patriotism that dumbfounded a war-mad world. Our Spanish-American war was financed by American capital, but it was in a sense a very exclusive affair. Only 320,000 investors out of our total population, or about one in 225, served capitalistically in its financing, while in the last War the financial structure was based upon 66,500,000 contracts signed by about one-fifth of our total population for the amount of 24 billion dollars. This fact is interesting as proof of the contention that democratic social philosophy kept the law of chance distribution as applied to capitalistic economy so freely operative that we were in a position to stage the first and only public war the world has ever witnessed.

United States bonds were safe, sure, and salable, and for this reason did not make an ideal primer upon which to base a nation's education in capitalistic credit instruments. Capitalistic credit cannot be stated in terms of profit and assurance alone. Profit and assurance must be stated only as relative possibilities with their accompanying variables of risk and loss. The chances of gain against loss are determined by the individual investor's accuracy in the estimate of value. These elements were not in our primer of capitalism because we did not dream for a moment the far-reaching effects that were to follow from this apparently innocent beginning.

Soon the change purse was to all but disappear in the process of exchange, and the bank check was to take its place. Its general acceptance in trade from hand to hand in such a short period, coupled with the fact that consumer credit was relatively one of the safest commercial risks, gives ample proof of the fact that we were more thoroughly grounded in capitalistic theory than we realized. The check came into general use simply because it seemed to be a more satisfactory means of transacting business. Without any dangerous degree of overdrafting as a deliberate form of dishonesty and a relatively small indulgence in the making of bogus checks we developed this simple instrument to the point where it made each currency dollar do from eleven to thirteen dollars worth of business every day. In the big year 1929 check clearings represented an exchange business about eighty times the value of the money in the country at that time. This may be looked upon as an evil, but it was an actuality and was possible only because of a general faith that we had in our institutions and in each other. It should be noted that it was the credit aspect of the check that gained for it its popularity. If the check had come into general use as a form of script money due to a general short-

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[2]Industrial Educator

age of currency, its general adoption would have been much slower.

Paralleling the general use of the check as a new found credit instrument, we find the increased use of the mortgage in its various forms. Here, again, facts prove that the extended use of the tool was not applied to its more normal purpose of retaining a deed to real estate that was, temporarily non-productive, because in most instances poor properties were not mortgaged. We must remember that 58 per cent of the farms in the United States today are totally free from mortgage debts, and 60 per cent of the farm mortgages are held against the most productive agricultural area in the United States. These mortgages were placed on territory the value of which increased $121 an acre over the five-year period from 1915 to 1920, and in one year alone this territory increased in value $63 an acre. The same situation prevails in urban mortgages, and the purpose of the mortgage in both situations was a broader general use of a credit instrument applied to more complex capitalistic practices. The ownership concept of urban and rural real estate was generally replaced by the investment concept. In both cases, money and property were not something that should be owned; they were something that should be owned for their utility in economic exchange.

It would not have been surprising to have the check and the mortgage, which by their very nature are individualistic and personal, become so generally used in an economic situation such as we experienced from 1917 to 1929, but these were in reality but the first steps in our democratization of capitalism. We, as a nation that but a generation ago depended upon European investors and government subsidy to finance the building of our railroads, in a few years became the world's greatest investors in foreign and domestic commercial and industrial credit instruments.

The advent of common and preferred stockholding by an increasingly large proportion of our population was well under way before the boom period. Its origin was the normal and sane desire of large industrial units to cultivate a closer acquaintance with a larger circle of folks. Many will not accept the implied humanism in the previous sentence, but will prefer to state the program in terms of fear of adverse legislation against monopolies, trusts, and mergers. The authors believe there is more economic data in support of the first statement than the second. But as a statistical fact we find that a program of extensive rather than centralized stock distribution is an economic reality.

The practice of diversification of stock investment by more investors should not detract from the full import of the above fact, because diversification is of itself an indication of a capitalistic maturity and balance now guiding the mass of investors. The actual number of individual stockholders in the United States, given conservatively as 3,000,000 people, is a vital fact, but it is decidedly secondary in importance to the economic philosophy that permits of such a fact. The boom, as an educational device reduced the space separating the New York Stock Exchange and its public from a matter of hundreds of miles to a matter of city blocks. It is now at the local bank, or better at the telephone. This is neither a horror nor a calamity. It is an economic necessity. Value can be stated in terms of price only by the process of exchange, and the more general the exchange the more accurate is price as a measure of value. This being the case, the stock exchange and a multiplicity of investment bankers are as necessary to the democratization of capitalism as is the telephone to the evolution of communication. These now make up the roadside market, not for butter and eggs but for what butter and eggs produce

**TABLE I**

Federal Income Tax Data—After T. J. Burke
Reported in Paper Trade Journal Vol. XCVI No. 9

"A"

| Year | Total Active Corporations Reporting (100 per cent) | Corporations Reporting Profits No. | Per cent | Corporations Reporting Losses No. | Per cent |
|---|---|---|---|---|---|
| 1926 | 2024 | 1365 | 67.44 | 659 | 32.56 |
| 1927 | 2028 | 1386 | 68.35 | 642 | 31.65 |
| 1928 | 2019 | 1345 | 66.62 | 674 | 33.38 |
| 1929 | 2079 | 1406 | 67.62 | 673 | 32.38 |
| 1930 | 2067 | 1114 | 53.89 | 953 | 46.11 |
| 1931 | 1946* | 815 | 41.87 | 1131 | 58.13 |

*Returns filed to August 31, 1932.

"B"

| Group | Per cent of Corporations Reporting Profits 1927 | 1928 | 1929 | 1930 | 1931 |
|---|---|---|---|---|---|
| Food Products, Beverages & Tobacco | 59.47 | 58.96 | 59.69 | 53.06 | 45.08 |
| Textile & Textile Products | 59.49 | 55.67 | 55.40 | 38.65 | 34.00 |
| Leather & Leather Products | 60.06 | 55.82 | 54.46 | 36.33 | 33.70 |
| Rubber & Related Products | 51.14 | 48.27 | 48.75 | 37.40 | 32.21 |
| Lumber & Wood Products | 53.45 | 53.98 | 53.31 | 31.20 | 22.17 |
| Paper, Pulp & Products | 66.54 | 64.26 | 64.55 | 52.72 | 40.72 |
| Printing & Publishing | 63.06 | 63.54 | 63.37 | 51.96 | 39.48 |
| Chemicals & Allied Substances | 54.78 | 56.41 | 54.27 | 44.54 | 39.14 |
| Stone, Clay & Glass Products | 55.25 | 55.15 | 53.40 | 38.21 | 26.36 |
| Metal and Metal Products | 56.00 | 59.20 | 61.12 | 39.31 | 24.43 |
| All other Mfg. Industries | 59.47 | 58.96 | 59.69 | 53.06 | 54.08 |

—surplus capital. In capitalism, surplus capital is a working tool; it is not an owned entity. Capitalism cannot exist on hoarding.

### Corporation No Longer a Mystery

The next great capitalistic device to be democratized was the corporation. The corporation as a type of business organization has ceased to be a mystery. A generation ago it was looked upon as an economic ghost. It made profits and hence was a good investment, but it was none the less just an unreality that had offices in New York, Chicago, or Pittsburgh. Today this capitalistic phantom has become the commonest of roadside realities. At no point in our history does the effect of our social philosophy on our economic theory show up quite so clearly. By frequent restatement our courts have transformed the corporation from a cold, lifeless legal entity into a system of contributive human relations open and understandable to the everyday man of the street. Today the corporation is a common device and the business tool most broadly accepted by even the novices in commercial enterprises. Its popularization is evidence of its utility in our economic adjustments, as well as a gauge of our capitalistic maturity. Our democratization of the corporation may indicate a lack of economic balance, but it does not indicate economic aristocracy. Tom, Dick, and Harry can have a corporation if they want it; and again, the important fact is that they do want it. The extent to which we have democratized the corporation is shown by the following data:

In the British Isles in 1920 there were 88,011 corporations.

In 1925 the State of New York chartered 24,703 corporations.

In 1925 the State of Delaware chartered 5,053 corporations.

Many of our states average more than 5,000 chartered corporations a year.

William Z. Ripley, in his book *Main Street and Wall Street*, estimates that 100,000 corporations were created in the United States in 1925.

By far the most of them are of the type indicated in the following news item, cut from the daily paper of a small midwestern city:

> "_____ FIBER PRODUCTS CO. IS ORGANIZED
> "Articles of organization of the _____ Fiber Products Co., Inc., of _____, have been filed at the office of the register of deeds. The purpose of the company is to 'manufacture, produce, and sell at wholesale and retail composition plugs, paper products, paper supplies, milling equipment, and supplies and sundries.'
> "The company is capitalized at $3,000, the capital stock consisting of 30 shares with a par value of $100 each. Articles of organization were signed by _____, _____, and _____.
> "Articles of incorporation have been filed also for the Northwestern Engraving Company of _____, which is capitalized at $20,000, having 200 shares with a par value of $100 each. The papers were signed by _____, _____, and _____."

The writer is aware that the process he has been describing under the caption of the "Democratization of Capitalism" is the well-known process of inflation. The unseemly length of the delineation was to make clear that inflation as we created it was a national expression of the admirable faith of an adventurous people in themselves and their institutions—a normal expression for a people whose national life has been the creating and upbuilding of frontiers. Inflation, when not created by the fiat of government, is always an expression of faith—a faith that extends beyond the sight range of common landmarks. The temporary obliteration of common landmarks results in a fear that is the cause of an intensive reorganization and assimilation period—the depression. As a historical fact, the depression never results in a going back or a returning to. It always has been the technic of dragging the most valuable and utilitarian of the old institutions over the unbroken wilderness trail to the new clearing. It is true that the institutions selected for transportation are racked and tried in their every joint. This abuse of the institution is a mark of its acquired esteem, as our present day over-zealous political ghoul hunting clearly indicates.

We have not as yet developed sociological research technics sufficiently keen to explain the method by which different nations select the institutions they wish to use to aid them in the work of reconstructing themselves after periods of serious disorganization. We know only that the agency selected in such situations is always a part of the common thread of its national history and one which is thoroughly in accord with its national aims, yet sufficiently undeveloped to possess a marked degree of adjustability in meeting new demands.

### New Aim of the Trade Association

This peculiar type of group expression is the explanation of the important place taken by the trade association in our reconstruction theories. Certainly one of the surprising aspects of our method of dealing with the depression has been our new faith in the ability of the trade association to function successfully in fields from which it has by custom and law refrained from entering. Whether such an agency, the legal boundaries of which were not determined until 1925, could have grown to such stature is questionable. The only active training experience that the American trade associations have had on a national scale was acquired shortly after the War. In both Europe and America at this time there was started, in some instances by the Government and in other instances by scientific societies, a wave of thinking that had for its purpose the development of a more efficient industrial set-up. In each case, it was an expression of loyalty aiming at national rehabilitation rather than personal profit. In Great Britain, Canada, and the United States the thinking was done entirely in the field of standard specifications for machines, equipment, and products. In Germany and Italy the program possessed social aspects and was known as Rationalization. We experienced a slight infection of the social phase of the idea in Technocracy. In the United States, the program originated from a combination of five national engineering societies, was later adopted by a number of governmental departments, and came into industry in the simplified form of the Waste Elimination Program advocated by Herbert Hoover while he was Secretary of Commerce.

This was the first and only large-scale co-operative activity to appeal to the great mass of the trade associations in United States industry.

Present day political theory states the function of the trade association as that of a social agent capable of administering self-descipline for the industry of which it is a part. This new aim of the trade association, it is generally agreed, is in the nature of a hope or a faith in growth. It states a purpose rather than describing an actuality. The assignment is a big one. It calls on a capitalistically evolved institution to solve the problem that Karl Marx believed capitalism would never solve. This interpretation of the trade association does not misstate the basic philosophy of capitalism, but it will force us to re-define the term capitalist so as to mean not an individual in possession of capital, as the popular idea now has it, but an individual who has sufficient knowledge of and belief in the laws and principles of a definite economic philosophy to make them workable in a constantly shifting business world.

**TABLE II**

Price Indices of Cartellised and Non-Cartellised Industrial Raw Materials and Semi-Manufactured Goods in Germany, January, 1929-1932 (1926 = 100.)

| | Cartellised | Non-Cartellised |
|---|---|---|
| January, 1929 | 104.6 | 101.9 |
| January, 1930 | 105.0 | 90.4 |
| January, 1931 | 95.2 | 66.2 |
| January, 1932 | 84.4 | 51.2 |
| Percentage decline, January, 1929, to January, 1932 | 19 | 50 |

Source: League of Nations World Economic Survey, 1931/32.

It is to be regretted that this trade association project could not be introduced under more fortunate conditions. It must be remembered that business conditions in the United States since 1920 have been such as to keep in all trade groups a large number of marginal units that could not exist in a more normal economic situation, and the price of their continued existence is a maladjustment in the commercial relations of the industrial groups of which they are a part. This fact is clearly shown in the Table I.

From this table, it is evident that too large a percentage of our industrial units are marginal even under very favorable business circumstances. It is unthinkable that the trade association can ever be productively used to keep such units active. To do so would totally violate the capitalistic theory of price. Price is determined in the process of exchange as the consumer with his changing tastes, his freedom of choice, and his estimate of value co-acts with the efficient producer in determining the normal price level. In analyzing Table I(b), it is interesting to note that the groups of industries receiving little or no tariff protection seem to make the best showing on profits.

If the depression psychology or paternalistic governmental practices insist that the trade association be a device used to destroy the flexibility of the general price level, we will be faced with the condition that was the chief obstacle to economic adjustment in Germany. The price level in Germany lost its flexibility, due primarily to the inadjustability of cartellised price and labor union wages. Table II shows the tendency of cartellised price to resist adjustability. Germany at this time was the most highly unionized nation in the world. If such a condition persists very long, it leads to the crystallization of the consumer into an organized unity expressing itself to combat the strategic position of the price controlling agents and results in some form of Facist expression, which is the organization of all other social groups against the parties of the wage and profit conflict. It usually expresses itself through acquiring the powers of the state to guarantee the rights of the consumers.

### Economic Right of Producer and Customer

The risk of such an outcome seems too great a price to pay to insure the existence of economic units that by all customary measuring rods have already proven themselves a deadweight on economic recovery. The great mass of establishments that would benefit from such an interpretation of the function of the trade association came into existence because of an inflated price level and easy credit. The inflated price level and the liberal credit condition have gone. To expect the customer or the efficient producer to replace their economic effect is capitalistic nonsense. The efficient producer has an economic right to the demand of the customer, and the customer has an economic right to the service of the efficient producer. Herein lies the wisdom of choosing the trade association as the avenue of approach to our present problem. The problem is a commercial problem rather than a purely manufacturing problem. The commercial area of our economic system is the area of collective relationships, and the trade association is the agency created by industry to perform those tasks that demand collective action. The satisfactory solution of these problems is the democratization of the idea of the trust. It will come, as a result of the workings of normal economic relationships, to be eventually crystallized into democratic law. It will not come by autocratic law remolding economic relationships.

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## Measuring Air Permeability of Paper Products

Relative to development of a standard method of measuring the air permeability of paper and fiber boards, the Bureau of Standards has made precise measurements of the effect of the various experimental conditions on the test values. The quantity of air forced through paper in this test has been found to be proportional to the duration of the test, to the pressure difference across the specimen, and to the area of the specimen, and inversely proportional to the thickness of the material. The relative humidity of the atmosphere was found to affect the air permeability, but in such a way that neither the amount nor the direction of the effect can be predicted. The results indicate a remarkably close agreement in behavior between the air passages in paper and long capillary tubes, which finding indicates that air in passing through paper must travel a long, devious course through the labyrinthine structure of the tangled fibers.

# Calculating the Length of Paper in a Roll

**D. S. DAVIS**
Dale S. Davis' Associates

THE calculation of the unwound length of paper in a roll is an important one and is of interest to manufacturers and converters alike. Often, however, the manufacturer and converter, in dealing with the same roll order, will employ widely different methods in determining this value. Inasmuch as the various methods depend upon the measurement of entirely different quantities, which are not capable of determination to the same degree of precision, divergent results are sometimes obtained and these may lead to unfortunate misunderstandings. It is the purpose of this article to derive and discuss the three most commonly used length formulas with a view toward relieving the situation.

### Nomenclature

In the ensuing discussion the symbols have the following significances:

L = unwound length of paper in the roll, feet.
D and R = diameter and radius, respectively, of the roll, inches.
d and r = diameter and radius, respectively of the core, inches.
c = caliper of the sheet, inches.
n = number of turns in the roll, or number of revolutions of the roll while unwinding between diameters of D and d.
W = net weight of paper in the roll, pounds.
R = ream weight of paper, pounds.
b = width of the roll, inches.

### Method I

Given: Diameters of the Roll and Core and the Caliper

$$L = \frac{\pi (D^2 - d^2)}{48\, c} \qquad (I)$$

The area of paper in the end of the roll is the difference between the area of the circle bounded by the outer edge and the gross area of the core or,

$\frac{\pi D^2}{4} - \frac{\pi d^2}{4}$ or $\frac{\pi}{4}(D^2 - d^2)$ in square inches.

The area of the sheet, unwound, is that of a rectangle L feet in length and c inches wide, or 12 L c square inches. Equating the expressions for the identical areas,

$$12\, L\, c = \frac{\pi}{4}(D^2 - d^2)$$

where the left side of the equation assumes the caliper to be the true average and the right side assumes the sheet to be wound ideally tight. On solving for the length,

$$L = \frac{\pi (D^2 - d^2)}{48\, c}$$

As suggested by Mr. H. F. Cotter, it is interesting to note that the edge of the sheet when wound on the core traces an Archimedian spiral, the radius of which gains c inches during each revolution or $\frac{c}{2\pi}$ inches during each radian swept through. The equation of the spiral, in polar co-ordinates, is evidently

$$R = r + \frac{c}{2\pi}\theta$$

and the length may be found by integrating the expression

$$^{2}L = \frac{1}{12}\sqrt{^{2}R^2 + R^2 {}_{2\theta}{}^2}$$

between r and R, which gives

$$L = \frac{1}{12}\left[\frac{R}{2}\sqrt{1 + \frac{4\pi^2}{c^2}R^2} + \frac{c}{4\pi}\ln\left(\frac{2\pi}{c}R + \sqrt{1 + \frac{4\pi^2}{c^2}R^2}\right)\right]_r^R$$

Because of the low value of c, the entire second term in the integrated expression becomes negligible as does 1 under the radical in the first term in comparison to $\frac{4\pi^2}{c^2}R^2$, so that the equation reduces to

$$L = \frac{1}{12}\left[\frac{R}{2} \cdot \frac{2\pi R}{c}\right]_r^R$$

$$= \frac{\pi (R^2 - r^2)}{12\, c}$$

$$= \frac{\pi (D^2 - d^2)}{48\, c}$$

which is identical with Formula (I).

Formula (I) is very convenient since only a rule and a micrometer are needed to provide the necessary measurements. However, its disadvantages are that it depends upon caliper, which is often far from uniform, and upon the manner in which the roll has been wound.

### Method II

Given: Diameters of the roll and core, and the number of revolutions of the roll while unwinding.

$$L = \frac{\pi n (D + d)}{24} \qquad (II)$$

The addition of the diameters of the roll and core gives Formula (II) a somewhat anomalous appearance and may lead one to believe that the expression is but a rough approximation. This is far from the case, however, since it is capable of several quite rigorous derivations, the simplest of which states that, for an ideally wound roll, the difference in radii of the roll and core, R — r, must be equal to n c, the thickness of n turns, each of which has a caliper of c inches. Equating and solving for c,

$$c = \frac{R - r}{n} = \frac{D - d}{2\, n}$$

On substituting this expression in Formula (I),

$$L = \frac{\pi (D^2 - d^2)\, 2\, n}{48\, (D - d)}$$

$$= \frac{\pi n (D + d)}{24}$$

The unwound length may also be considered as the sum of the circumferences of n nearly perfect circles.

Inspection of Fig. 1 shows that the diameter of the first turn is $d + c$; of the second, $d + 3c$; and of the third, $d + 5c$. The corresponding cumulative sums of the diameters are $d + c$, $2d + 4c$, and $3d + 9c$, the cumulative sum of the diameters at the n-th turn being, by inspection, $nd + n^2 c$. The sum of the n circumferences is $\pi n (d + nc)$ inches so that

$$L = \frac{\pi n (d + nc)}{12}$$

Substitution of $c = \frac{D - d}{2n}$ in the length expression leads to

$$L = \frac{\pi n}{12}\left(d + \frac{D - d}{2}\right)$$

$$= \frac{\pi n (D + d)}{24}$$

Although the diameters of the roll and core are easily measured and the number of turns is conveniently read from a revolution counter, it must be remembered that the results obtained by application of Formula (II) depend somewhat upon the tension with which the roll has been wound.

### Method III

Given: Net weight of the roll, width of the roll, and the ream weight of the sheet.

$$L = 36{,}000 \frac{W}{R\,b} \qquad \text{(III)}$$

When the ream dimensions are 24 in. x 36 in., 500, the ream weight, R, is the weight of 500 x 2 x 3 or 3000 square feet, and the weight of one square foot is $\frac{R}{3000}$ pounds. The total number of square feet in the roll is the quotient of the net weight of the roll and the weight of one square foot or $\frac{3000\,W}{R}$. The unwound length is the quotient of the total area and the width of the roll in feet, $\frac{b}{12}$, or

$$L = \frac{3000\,W}{R} \cdot \frac{12}{b}$$

$$= 36{,}000 \frac{W}{R\,b}$$

The constant, of course, depends upon the definition of the ream. When the ream dimensions are 24 in. x 36 in., 480 and 25 in. x 38 in., 500 the constants are 34,560 and 39,580, respectively.

Formula (III) may not always be as convenient to apply as Formulas (I) and (II) since it requires weighing of the roll and core, determination of the ream weight, and measurement of the width. However, it is more accurate than Formula (I) when sufficient ream weight samples are taken to make sure that they are representative since R in (III) can be determined with greater precision than can c in (I). In addition, Formula (III) is independent of the tension with which the roll is wound and applies to tightly and loosely wound rolls alike and is thus superior to both (I) and (II).

All three equations are most readily solved by means of alignment charts. Such charts have already been prepared for: Formula (I), THE PAPER INDUSTRY, Vol. 12, No. 10, p. 1741 (1931) and the *Pulp and Paper Magazine of Canada*, Vol. 31, No. 12, p. 401 (1931); and for formula (III), THE PAPER INDUSTRY, Vol. 13,

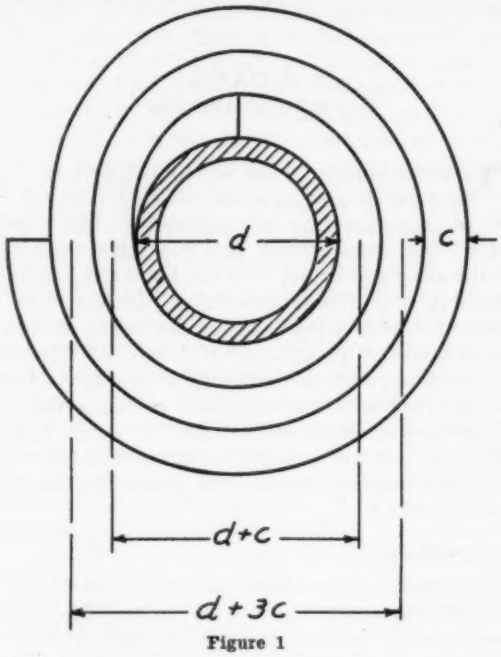


Figure 1

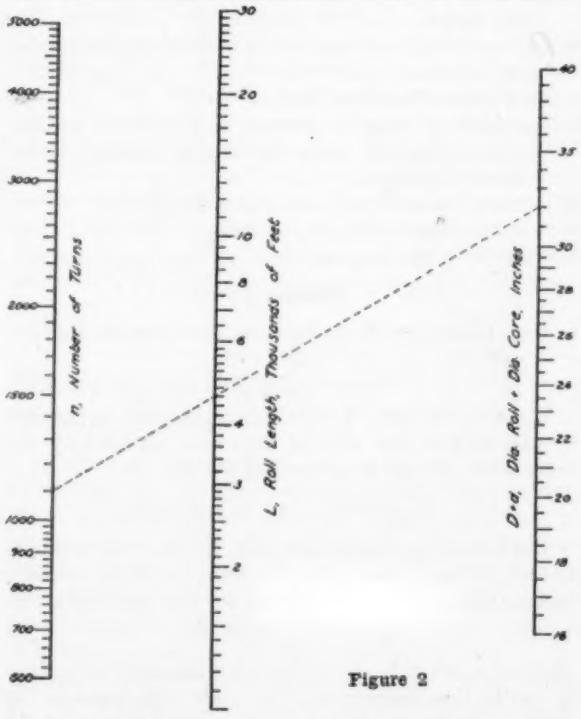


Figure 2

No. 9, p. 1101 (1931). Figure 2 covers the solution of Formula (II) and its use is illustrated as follows: Eleven hundred turns are unwound from a 24-in. roll of paper, after which the diameter is 8 inches; what length has been unwound? The broken line which connects 1100 on the n-scale with 24 + 8 or 32 on the D + d scale crosses the L-scale at the desired value, 4610 feet.

# Size Testing of Board

By PIERRE DREWSEN, Chemical Engineer
The Hinde and Dauch Paper Company

IN 1929, according to the Fifteenth Census, out of a total of all paper machine products of 11,140,235 tons, the Board Industry of the United States produced 4,451,187 tons, or about 40.0 per cent. The production of liners, chip and straw was 2,255,537 tons, or about 20.0 per cent of the total, as compared with: 1,605,783 tons of wrapping, or about 14.4 per cent; 1,497,912 tons of book paper, or about 13.4 per cent; and 1,409,169 tons of newsprint, or about 12.6 per cent. In value of products made, chip, straw and liners are credited with $99,162,946 out of a total of $903,301,140, or about 11.0 per cent; 1,108,852 tons of liners were produced, or about 9.9 per cent, of which the reported value was $55,212,515, or about 6.1 per cent.

The above statistical summary is submitted to indicate that the Board Industry is of some importance in spite of the fact that we have heard it argued that board is not paper. It is not our present purpose to debate this question. The Government, for tariff purposes, arbitrarily fixes an upper limit of twelve thousandths of an inch thickness for paper, above which the product is called board. The dearth of technical literature on the subject of board is considered to be of more consequence than disputes about the name of the product, which is after all, a matter of definition.

Test methods for the product of board machines should receive more attention. Among those being used at present we may include the measurement of the weight per thousand square feet, caliper, bursting strength, bending quality and sizing, or as it is sometimes called, "waterproofing." At the present time, there are no standard manuals or procedures for any of these tests. The new T.A.P.P.I. Manual includes specifications covering each of these procedures for paper, but not for board. In discussing sizing we hope to make it clear that much remains to be done in improving board testing technique.

We will assume that anyone who has read this far is sufficiently familiar with paper machine products to know that by board is meant the .009, .012, .016 and .030 caliper material out of which corrugated and solid fiber containers are made.

In *Modern Pulp and Paper Making* G. S. Witham, Sr., states that "size is any substance which is added to a porous surface to render it less so." In the Bureau of Standards Technologic Paper No. 326, F. T. Carson speaks of the degree of sizing of paper as "the resistance to permeation by aqueous liquids," and of sizing as "the process of incorporating water resistant materials so that the paper resists wetting." These definitions suggest the thought that sizing is designed to improve the surface as well as the resistance to water. In the different divisions of the paper industry, the relative importance of these factors varies, and indeed in some grades of paper, smooth surface and water resistance are undesirable. It is obvious that the ultimate purpose of the product determines the selection of test methods.

In Technologic Paper No. 326, Carson lists and describes thirty-eight different methods of testing paper for the degree of sizing. These are divided into four classes: those which test by means of ink, by means of interacting solutions, by means of electrolytic methods, and by means of water. He discusses critically the difference between surface sizing and internal sizing, and he concludes that the water type methods are most indicative of degree of sizing, and that, of the water type methods, the curl method, and the dry indicator method give the most consistent and dependable values for the degree of internal sizing. We recommend the study of this excellent pamphlet to anyone interested in sizing who is not already familiar with its contents.

We will not describe the dry indicator method in detail for the reason that it is not yet worked out for testing board. The new T.A.P.P.I. Manual describes it under code Number T433M, in which it appears as a modification of the method proposed by Carson. It consists, in brief, of sprinkling on the surface of a test sample of paper an intimate mixture of methyl violet dye and sugar, and then bringing water in contact with the opposite side of the sheet. The elapsed time between this contact and the moment when the dye begins to dissolve and change color is a measure of the degree of sizing of the sample.

We propose to describe some methods which are not included among the thirty-eight and which are being used today in testing the degree of sizing of board.

### Water Bucket Test

The first of these is the time honored "water bucket" test which consists of folding a piece of liner board into an open top box, using paper clips to hold the corners together. In folding, the liner side should be inside the box. The box is then suspended and filled to a depth of one inch or so with water, and is observed from time to time to see whether the water penetrates to the filler side. In some mills a period of three hours is specified as the standard time before any penetration may take place.

The water bucket is a very simple test and requires practically no equipment other than a wooden block to facilitate folding, and some sort of a rack on which to suspend the test samples. Some papermakers prefer to fold the board into a small cone, fastening the upper end with a paper clip, and then standing the cones in a shelf with circular holes. This appears to be a good rough and ready method for the machine room. Samples taken from every reel of paper are by this means arranged one after another, and indicate at a glance whether or not the sizing is satisfactory, enabling the superintendent or tour boss to take corrective measures, if necessary. Of course, in this case, the sample contacts the circular hole in the shelf, but the disadvantage of this, if any, appears to be compensated for by quick and ready handling, an advantage not to be underestimated when backtenders are busy.

One disadvantage of the water bucket is the long time it takes for a positive result when board is prop-

erly sized. Another disadvantage is the possible presence of pin holes, one or more of which will make it difficult to tell how well the inherent sizing of the fiber has been accomplished. Pin holes, of course, require immediate correction, and perhaps in this respect the old water bucket is a valuable test. However, it lacks mathematical precision; therefore, is unsatisfactory to some extent for laboratory or comparative tests.

### Hot Water Flotation Method

Another test for board sizing not listed among the thirty-eight may be called the Hot Water Flotation Method. It has the advantage of comparative rapidity, and, in addition, is a valuable index of liner formation by the appearance of the upper surface of the sample during the penetration by the hot water.

Test pieces of board are cut about three inches long by one-half to three-quarters of an inch wide, the three-inch length being along the machine direction in order to confine the subsequent curling of the sample to the cross direction. These test pieces are dropped, filler side down, on water, the temperature of which is 180 deg. Fahr. The time of penetration of the water in seconds is taken as the index of the water repellant character of the board. A resistance of over thirty seconds indicates good sizing, and if penetration is delayed over three minutes the board may be considered hard sized.

This test is simple, but does not find favor as a control method among all superintendents for the reason that it does not offer visual evidence of the progress of the sizing, such as a row of water buckets does. The superintendent likes to enter the machine room and to be able to tell at a glance how the sizing is standing up without asking his backtenders about it. In other words, the hot water flotation method tells its story too quickly to be of use in this respect. For settling disputes later on, or for comparing two pieces of board, it is very satisfactory.

The hot water flotation method is said to be inapplicable for boards sized with wax, or with wax and rosin, because the melting point of the wax is generally below 180 deg. Fahr. One of our friends has suggested that 120-degree water be used for boards sized in this manner.

### Another Test for Degree of Sizing

Another method of testing board for degree of sizing is to pipette exactly one cubic centimeter of water on the liner side of a sample lying in a horizontal position; then record the time required for it to be absorbed completely. If precautions are taken to guard against evaporation, this method should possess some merit, especially for slack sized boards, but for hard sized sheets, the time element may be out of all proportion.

### Waterproofing and Moisture-proofing Are not Identical

Board is sized to improve its surface, and to meet certain needs of the container into which it is to be converted. One of these needs is to guard the contents against water damage. There is a difference, however, between resisting the effects of a mild rain while passing through a few city blocks on an uncovered truck and withstanding the ravages of a sea voyage to South America; between delivering an order of hardware, and preventing print paper from either moisture absorption or evaporation while on the shelf of the printer's shop. Which brings up the question whether protection is desired against water, or water vapor, or both.

Rosin sizing of paper is frequently, though incorrectly, referred to as "waterproofing," and there exists a well established misapprehension that "waterproofing" and "moistureproofing" are identical. As a matter of fact, there appears to be little, if any, relationship between them. In order to test a sample of board for moisture resistance, it is necessary to establish a condition where the percentage relative humidity on one side of the sample is maintained at a different level from that on the other side of the sample. For example, if it were possible to make a box out of the material to be tested, which assumes that satisfactory methods of folding and sealing are available, and the box were partly filled with a desiccant such as dry calcium chloride, and the box were then suspended in an atmosphere of one hundred, or any other fixed percentage relative humidity, the gain in the weight of the box would be a direct measure of the quantity of water in the form of water vapor which had passed through its walls. Assuming no temperature variations, the conditions of this test would be constant because the atmosphere inside the box would be at practically zero relative humidity, and the air outside at one hundred, or any other that may be desired. The results could readily be expressed as so many weight units of water transmitted, per unit of area, in one unit of time, for each per cent of humidity difference, in much the same way that the coefficient of heat conductivity is expressed as B.t.u. per square foot, per hour, per degree of temperature difference, per inch of thickness.

Precise descriptions of test methods of this nature have been prepared, and if not already published, will no doubt be released at an early date by one of the T.A.P.P.I. Committees.

Anyone who makes water vapor transmission tests on container material is soon impressed by the fact that a sheet of board may be hard sized and yet offer less resistance to the passage of water vapor than another sheet of board which contains no sizing whatever. If the investigation be carried further, it will be found that the degree of sizing, the vapor transmission rates and the Gurley Densometer readings bear no definite mutual relationship. In other words, liquid water, water vapor, and air are transmitted through a sheet with which they are in contact, at rates which not only differ from, but which are independent of one another. It appears logical to assume that this passage takes place by virtue of some force or influence, such as the air pressure in the densometer, and the humidity difference in the vapor transmission test, but no attempt will be made here to guess at the nature of that which tends to force water through a sheet against the resistance offered by the sizing agent. It is only suggested that this topic offers a fertile and profitable field for thought as well as for experimental investigation, which it is hoped will soon find its way into the technical literature, to the end that the manufacture of container board will approach, more rapidly than it has in the past, the status of an exact science.

# Determination of Fuel Losses

By W. F. SCHAPHORST, M. E.

ABOUT a year ago a prominent manufacturer who has made many installations in paper mills put this problem up to me: "Can't you make up a simple computing chart for us on flue gas losses which will take the $CO_2$ losses into consideration as well as heat losses due to high flue gas temperature? Our present charts and computation methods are cumbersome and unsatisfactory. Such a chart need not be absolutely accurate, but it should be close enough for most practical purposes."

After much searching, letter writing, and inquiring I failed to find a formula which fulfilled the manufacturer's specifications. There wasn't one. It was first necessary to develop such a formula—a formula based on a combination of test data and other formulas already in existence. Then that done, the accompanying chart was developed.

To use the chart simply zigzag a ruler from left to right, as indicated by the dotted lines, and the losses are instantly found in column C.

### An Actual Example

For example, the value of a coal used under the boilers of a certain paper mill is 13,500 B. t. u. per pound; 85 per cent of the coal is carbon; the flue gas contains 7 per cent $CO_2$; the flue gas temperature is 600 deg. Fahr. and the temperature of the air entering the furnace is 75 deg. Fahr. What is the heat loss up the chimney due to low $CO_2$ and the temperature rise of (600-75) 525 degrees Fahr.?

Applying the chart, the dotted lines show the solution of the problem as follows: Run a straight line through the 13,500 B. t. u.; column A, and the 85 per cent carbon, column B, and locate the intersection in column C. Then run a line through that point in column C and the 7 per cent $CO_2$ in column D, locating a point in column E. Then run a line through that point in column E and the 525 degrees difference, column F, and the intersection with column G shows the fuel loss to be 27.7 per cent.

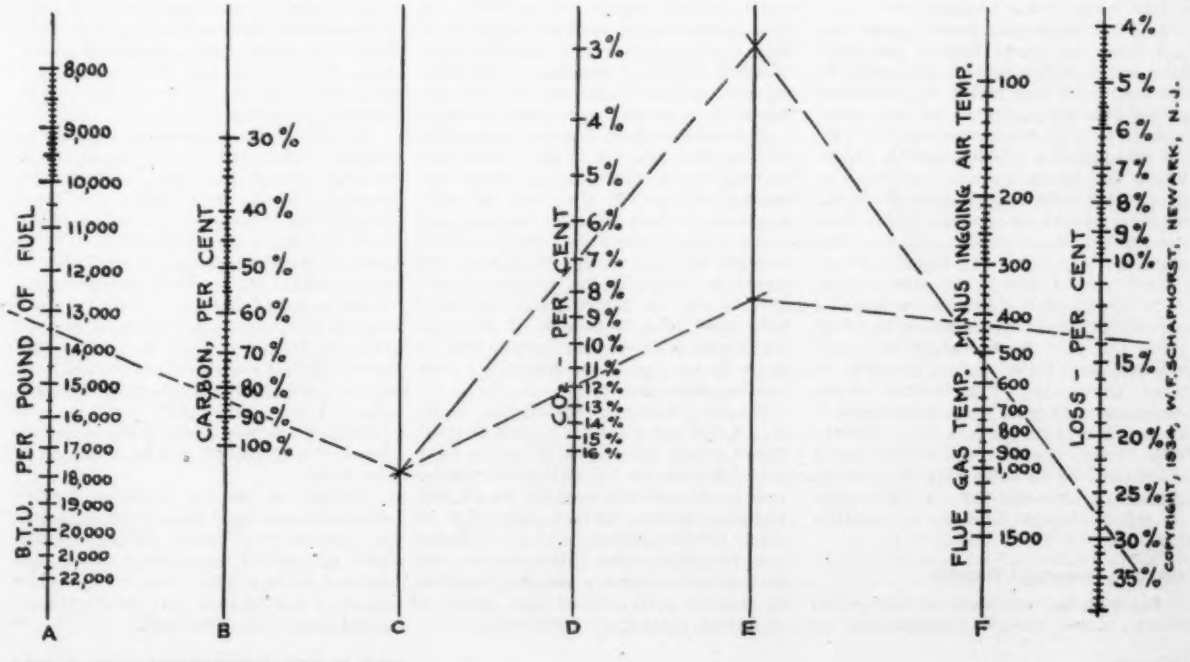
### Improving Conditions

Let us now suppose that furnace conditions are improved to the extent that $CO_2$ becomes 12 per cent and flue gas temperature is reduced to 500 deg. Fahr. Temperature of air entering the furnace is still 75 deg. Fahr., hence the "difference," column F, is 425 degrees.

Applying the chart the same point in column C is located as already instructed. Then run a straight line through that point and the 12 per cent $CO_2$ in column D locating a new point in column E. Then from this latter point run through the 425 in column F, and the fuel loss, column G, is found to be 13.7 per cent.

### What Is the Saving?

Obviously now, the saving in fuel due to improvement in conditions is the difference between the two losses as computed above, namely, 27.7 per cent — 13.7 per cent = 14 per cent saving.



**Pulpwood fire at plant of Detroit Sulphite Pulp & Paper Company, Detroit, Mich. This pile contained 17,800 cords of peeled spruce. Sparks from an acetylene torch used on an overhead conveyor trestle caused this blaze**

## An Insurance Engineer Reviews

# Paper Mill Fire Hazards

**By M. E. BULSKE, Chief Engineer**
**National Inspection Company**

PAPER MILLS as a class, particularly if unsprinklered, have proven unprofitable to many fire insurance companies. This has been strikingly evident among plants using rags, paper or straw, in whole or in part, as raw material. New cloth clippings, while subject to some contamination through sweepings and baling, are reasonably safe; but old rags, though claimed to be sorted at some gathering and processing point, may contain oil, grease and paint saturated specimens. Waste paper may include matches, film, grease and a wide array of foreign substances, many subject to spontaneous ignition.

The fire record of waste paper, rag and junk handling risks is generally poor and though a certain proportion of the aggregate loss might be attributed to careless housekeeping or the moral hazard, it is quite definite that the risk of spontaneous combustion is high. While the administration and care in paper mills may be, and generally is, far superior to that encountered in the average rag and waste paper plant, it is also apparent that a certain degree of this hazard carries over to the paper works. This is illustrated by the number of paper mill fires that originate in or involve the raw stock (paper and rag) warehouses. Fires in straw stacks or along the train of production to the digesters have been quite prominent in strawboard mills in days past. On the other hand, the record of mills using wood and/ or sulphite pulp is more encouraging, although the wood room and its refuse disposal presents a consideration.

### Common Industrial Hazards

Paper mills in common with other plants, have certain fundamental or common hazards, primarily heat, power and light. It is always good practice to detach a power plant from the works proper and, if it adjoins, provide approved, double, automatic fire doors at all communications. If wood or other refuse is used for fuel, segregation or definite cutoffs are strongly recommended and, in such cases, the boiler room should be of so-called fireproof or incombustible construction.

All boilers should be mounted on dead concrete or earth floors with front, rear and side clearance ranging from 36 to 96 inches, depending on whether the installation is high or low pressure. Where it is necessary to erect a boiler over a wooden floor, a special mounting will be required, such as fireproof arches between steel beams or at least two courses of hollow tile laid at right angles over sheet metal or asbestos and covered with boiler plate. Three courses of brick with the top course laid on edge would be acceptable but when any work of this sort is contemplated it would be a good plan to inquire of the local insurance body having jurisdiction or write to the insurance company's engineering department.

Proper clearance for metal boiler breechings and stacks is very important. There should be at least 36 inches clearance between the breeching and wooden roof or combustible material on all high pressure boilers, though clearance for small heating boilers may be 18 inches and, in either event, this clearance may be reduced one-half when the breeching is covered with two to four inches of magnesia lagging or equivalent.

Brick stacks should be built solidly from the ground, heavily lined and capped, and extend at least three feet above a flat roof or two feet above the ridge of a peaked roof. Metal stacks should be riveted, heavy gauge metal, braced every twenty feet. Where possible, they should not extend through a combustible roof. However, if they do, a ventilating thimble extending nine inches above and nine inches below the roof with a clearance of eighteen inches should be provided, although nine inches clearance is satisfactory for small boilers. Outside metal stacks should be at least 24 inches away from any combustible building, door, window or wall opening. Cleanout doors should be built into every stack and used at regular intervals. All stacks should be rodded against lightning.

If solid fuel is used, it should be handled and fed from metal bins, through metal spouting to automatic stokers but, if the boilers are hand stoked, the fuel piles should be kept well back from the firing doors, particularly if wood or refuse is regularly or occasionally used. Wood refuse introduces a heavy hazard in boiler rooms and if there is more than can be used at once, it is necessary to erect a fireproof shavings vault which should have a good, automatic, fire door at its opening and be provided with remotely controlled steam jets; if the plant is sprinklered, the system should be extended to the vault.

Stacks of refuse burning boilers should be equipped with spark arresters as should any refuse burners which may be erected to consume excess material. It is a good plan to wet down piles of refuse that may inadvertently accumulate in the boiler room. A

**Above—This pulpwood pile at Port Alfred Pulp and Paper Co., Port Alfred, Quebec, a quarter of a mile long, contained nearly a quarter of a million cords of barked spruce pulpwood. It was destroyed by fire in April, 1932**

**Left—Scene at the north end of the Port Alfred pulpwood pile on the eleventh day of the fire**

standpipe with a good length of hose is handy here.

If coal pulverizing is done, there is a dust explosion hazard and always a possibility of tramp metal getting into the mills. To avert this situation, only reliable equipment should be purchased and it should be mounted away from open flames and kept tight and free of dust; a magnetic separator should be installed ahead of the mill and vapor proof electrical equipment installed in the vicinity of the pulverizing operation.

If oil fuel is used, care should be taken to install an "approved" burner or at least such apparatus as is pump fed and will meet the approval of insurance inspectors. It is quite dangerous to attempt a home-made installation unless the subject is thoroughly studied in connection with approved specifications. Oil tanks should be buried or, if above ground, must be detached, diked or with the land slope away from the plant and from any exposures. Gas installations require an outside pressure regulator, inside and outside cut out valves and constant vigilance against leaks.

Steam pipes and radiators should be lagged where passing through combustible material or partitions and spaces behind radiators and pipes should be kept clean. Where fan and coil heating systems are used the fan bearings should receive regular attention and room kept clean.

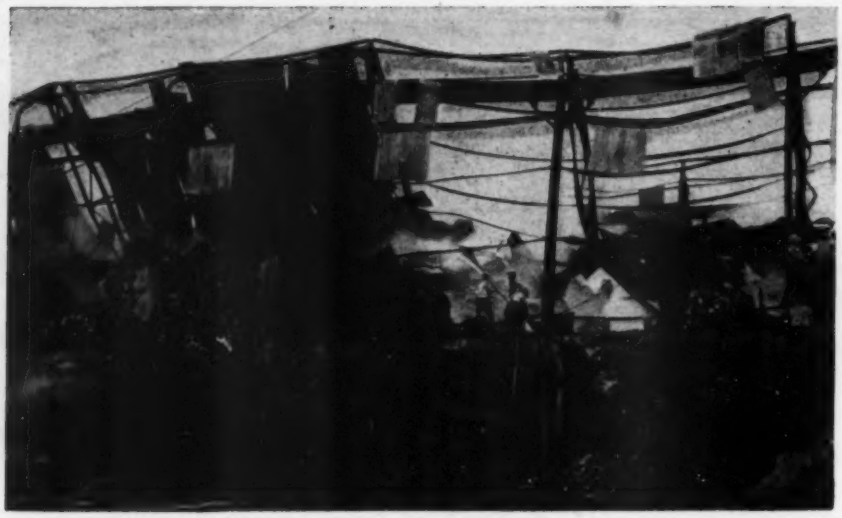
It is apparent that, for want of better information, electricity is charged for more than its share of fires. Yet, the electrical hazard is so important that a plant of any appreciable size should maintain an electrician who is really competent. There is so much to discuss under this heading that the safest recommendation would be to secure a copy of the National Electrical Code for your electrician or millwright, have him check your installation against its provisions and then have him do no work or make no alterations unless they conform to its rules.

It should be held in mind that, because of age, vibration, moisture, corrosive influences or other factors attending processes, electrical equipment deteriorates and, unless given constant attention, may easily become dangerous. It must also be remembered that a fuse is a safety valve on the circuit and, when a fuse "blows," the trouble should always be ascertained and corrected; never, not even temporarily, should a wire bridge, shunt or other makeshift be used in place of a fuse. Transformers of any size (they are insulated with oil) should be outside or in cut-off fireproof, vented and drained vault with lipped doorways. Direct current motors are objectionable in dusty locations, such as a rag shredder room. Do not countenance light extension cords, drop cords (which may be draped over piping, nails, etc.), unguarded portable lamps, dirty commutators, sagging or crossed leads, wooden switch or rheostat panels, paper lamp shades and electric irons or grills without stands or pilot lights. Watch the insulation and supports and order at least an annual checkup of the entire system. Gas light is hardly met with now, so it will not be discussed.

The hazard of direct steam engine power is low; the engine must be kept in good condition through regular overhaulings. Line shafting must be kept aligned and bearings well oiled and running cool. Regular inspection and overhauling of electric generators is an economical and safe practice; the oiling system of large steam turbine generators constitutes a hazard and regular review of the condition of the reservoir, piping, governor, pump and tests of the viscosity of the oil itself are recommended. Steam pipes under oil lines should be relocated or at least clad with sheet metal over the customary lagging to protect against drip; flanges, gaskets, gauges and other fittings should be carefully watched for leaks and deterioration. Where water power is used, there should be regular inspection of the wheel room; oilers or attendants should be warned against discarding oily rags and this section should be swept out regularly and kept clean; no loitering should be permitted here or in any other inaccessible place. Gas, kerosene or Diesel engines require special installation and company engineers will be pleased to provide details; exhaust pipe clearance should be at least 9" and main oil or gas supply should be outside and under good control; hot tube ignition is dangerous; exhaust pipes should not pass through or near combustible partitions; mufflers should be cleaned out regularly. Locomotives plying a yard containing baled rags or paper (a poor practice) should have spark arresters on stacks.

Wooden lockers belong to the horse age. Metal lockers or a special locker room with a pipe rack and hanger layout or a pulley and chain system for clothing are more modern, sanitary and safe. Wet, oily or paint saturated clothing should never be allowed in the locker room.

Smoking should be strictly prohibited and employees discharged for wilful violation of this rule. Unreliable employees will seek the unfrequented areas of the plant, usually little used warehouses, to



Cooling down the remains of a huge, all-steel and concrete (so-called fireproof) baled rag warehouse of a paper mill. Note structural collapse and buckled steel

steal a smoke, and the toll of such infractions is hardly appreciated by other than insurance interests. An incombustible power plant, the office or the cafeteria, which are under constant supervision, might be designated as excepted areas during the noon hour but that is all. Safety departments and plant managers cannot lay too much stress on this feature.

**Special Paper Mill Hazards**

All raw stock should be in a well detached or at least a cut-off incombustible or fireproof building; baled stock should be kept low along wide, clean cut aisles. Yard storage against buildings is undesirable, but if separated 200 feet or more from the plant it is excellent practice.

All bale opening, thrashing, sorting, shredding, picking and dusting should be done in a room on section which is well cut off from the balance of the works by a high parapeted brick wall and good double automatic fire doors. This room should be of fireproof construction and equipped with good automatic sprinklers since these departments are usually dusty and lint laden.

As pointed out before, electrical installations should be dustproof; a water spray ought to play over the stock feed of the shredder and some system of eliminating tramp metal ought to be installed ahead of the machine. This department should be cleaned down every day, preferably with the aid of air hose; motors and switches should be inspected and blown out or otherwise cleaned. Water buckets with pails are handy first aid for fire considering the class of help usually employed at this operation but hand hose and chemicals should be in reserve.

If the plant is reducing wood to pulp, the operation may be almost entirely wet and the hazard strictly mechanical. Logs may be cut into bolts two or three feet long, bark removed by tumbling in a steel rotary under a water spray. The refuse from the barking machines constitutes a hazard and it should be promptly removed, sold or burned. When a chipper or hog is used, the device requires close mechanical attention but usually works on wet stock and if so is not a prominent fire consideration. Sulphur burners in connection with acid towers should always be in a small, separate incombustible building or lean-to with sulphur stock in a small bin of similar construction. All lime preparing ought to be done in a similar layout. If cooking or digesting is done, the steam lines should be kept clear of all combustibles and the digester building cleaned regularly to avoid the messy condition frequently encountered in these rooms.

In fact, the entire train of production from the waste paper, rag or straw storage rooms to the beaters is apt to be mussy unless strict care and constant sweepings are an iron bound rule. This point cannot be stressed too strongly, because it is believed that the loss ratio of the class could be reduced materially by a very rigid system of housekeeping in these units.

Process operations through the beaters and jordans is wet and the fire hazard is very low. Paper machines represent very heavy values but in the event of loss, require an extended period for replacement. The hazard, however, is low since they are steam heated. The dryer pit should be cleaned regularly of paper accumulations. Scrap from the pit or cutters should be baled as it is produced and stored in orderly piles until reworked. If there are any paper drying tunnels or chipboard dryers, they should be of metal or other incombustible material, indirectly heated and, if possible, sprinklered. If asphalt dipping is done, there is a very serious hazard. Asphalt dip tanks should never be direct fire heated. The records of insurance companies are replete with losses caused by direct fire heated melting kettles, pans, vats and the like. Such systems are not susceptible to proper control of temperature and leave too much to the human element. Superheated steam or a special layout involving the circulation of hot oil which is heated by direct fire in a small, low valued, detached, incombustible shed is satisfactory, but even then the control and drain design should be good and the operation hooded and vented. All asphalt melting kettles should be detached in the yard.

**Hazards of a Miscellaneous Character**

Machine, blacksmith and other service shops present small but nevertheless important hazards. Machine shop turnings should be removed regularly; they should not be piled against a building, thrown into a basement or swept into a corner where they can oxidize. Parts should not be washed in gasoline; a hot caustic bath should be substituted. Safety waste cans should be provided for rags, waste, etc., and forges should be set clear of combustibles on earth or cement floor with adequate vented metal hood. Refuse of the carpenter shop should be swept up daily and glue pots should be placed only over tile, asbestos insulated metal protected or similarly equipped benches; if gas heated, rigid pipe should replace all rubber hose; if electric heated, a separate switch and pilot light should be provided. A large carpenter shop might call for a dust collecting system, which ought to extend to all machines. Gasoline filling of cars and trucks should be outside from an approved pump drawing from a buried tank. A small shed or house detached in the yard should hold all reserve supply of oil, paint, etc. If printing is done, volatiles used for cleaning should be kept in small safety cans.

**Automatic Sprinklers**

A thorough automatic sprinkler installation is the best protection, although the corrosive atmosphere in paper mills is hard on the heads and piping in some departments. Furthermore, baled stocks must be kept low and well divided to relieve sprinklers of this handicap. Therefore, corrosion proof heads are highly desirable, and periodical painting of the piping and valves is both a protection and wise economy. Heads not of the glass bulb or corrosion proof type should be watched carefully, replaced or cleaned

when necessary and redipped in a wax solution. The gravity or sprinkler tank should be kept full; the maintenance man should not rely on the tell-tale (frequently homemade) or even a gauge, but should climb or overflow the tank at least weekly. Fire pumps should be operated once a week and pressure brought up to the relief valve discharge point. All city connection, tank, post indicator, and riser valves and sectional or floor shutoffs should be checked at least weekly to see that they are open and work properly. All stock should be kept 24 inches below the sprinkler heads. Corroded heads, obstructions, bent piping, leaking heads, disconnected piping, freezeups, faulty fire doors, unheated valve closets, etc., should be reported. It is highly recommended that one man who is thoroughly competent and understands mechanics, be placed in charge of and made responsible for the system, inspect it daily and file a report on the condition of the various appliances. Dry valves should be tripped at least once a year (in warm weather) and reset after making any necessary repairs.

**First Aid Appliances**

The same man could look after the fire doors, fire hydrants, hose houses, equipment therein, chemical and hose carts, chemical extinguishers, water barrels and pails, steam jets and other special protective apparatus. As to chemical extinguishers. There are different types for various needs. They should be recharged at least once a year where the type so requires. The carbon-tetra-chloride type is recommended for electrical fires and the foam or carbon-dioxide for oil, paint and similar blazes, although the latter can be used effectively under any conditions where gas can be held at the seat of a fire or can be confined to a limited area. Soda and acid, calcium chloride (non-freeze), pump tanks, water barrels and pails, sand buckets, hand hose, etc., are useful and have their place, but it would be well to consult with an inspector or other informed person as to the quantity and type to purchase and how to locate them. Watch service must include a reliable employee and a local or central supervision system. Any inspector will assist in laying out a thorough route.

After all, the development of the right mental attitude toward fire prevention among the personnel of any organization goes far toward the elimination of fire. Not only does a fire put men out of work but, regardless of all the fire and business interruption insurance carried, there is a certain loss sustained by any successful concern that simply cannot be insured against. A competitor is always anxious to crowd in when deliveries can't be made or when there may be the slightest threat of delay.

Every plant of any appreciable size should have a private brigade, trained to handle its equipment and drilled regularly. There should be a safety council composed of employees and executives, encouraged and financially aided by the management. The entire organization should take pride in the cleanliness and efficiency of its plant.

The successful management will readily concede the vital necessity of preserving its producing units, but, invariably, this question arises: "If we make improvements and conform to the best standards of fire prevention, do the insurance companies appreciate it and does it have a bearing on the rate?" Certainly! Fire prevention not only tends to preserve the integrity of a business but pays consistent dividends in lower insurance premiums. This will be better understood when it is known that, in most states, rating is done under an analytic system of measuring the fire hazard. In other words, while the classification of the town in which the property is located, primarily its water and fire fighting facilities, has an important bearing on the basic rate, the construction of the plant, separation of its component units and various incidental structural features have a very definite value in determining what you pay. The rate schedule also is a complex system of credits and penalties, so that elimination or improvement of a hazard, installation of protective devices and similar factors will reduce the rate, while additional hazards, defective arrangements, poor construction, ineffective cutoffs and poor housekeeping will increase the rate. The installation of standard sprinklers almost invariably results in a slashing rate reduction; in the course of a few years they frequently pay for themselves.

To a large extent, the matter of what is paid in insurance premiums is in the hands of the individual management. The insurance companies are trying to do their part. Some plants co-operate, some seem to do so in lukewarm fashion, and many are indifferent. Where does your organization stand?

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## ◆ Prevention of Fire in Pulpwood Storage

In a late bulletin issued by the Associated Factory Mutual Fire Insurance Companies, on the subject of Fire Prevention and Protection Fire-Fighting Methods for Pulpwood Storage, the following points are listed for the prevention of fire in pulpwood piles:

**Recommendations in Brief**

Keep wood refuse, rotted wood and bark out of the piles.

Remove dry grass, brush, and rubbish, and maintain excellent order and neatness throughout the storage area.

Remove all wooden sheds from wood yards.

Make motor and conveyor housings non-combustible, and install sprinklers where practicable.

Keep moving parts of conveyors well lubricated. Use water liberally on conveyor troughs.

Install and maintain spark arresters on stacks of locomotives and hoisting engines. Provide well-designed waste-burning boilers.

Do not use dynamite to reclaim frozen piles. Use safer methods such as winch and cable drag, power rake, or grab bucket.

Strictly enforce the "No Smoking" rule.

Install and maintain electrical equipment in standard manner.

Provide hourly watchman's service with record at all times at stacked piles and at extensive yards of ranked piles.

Wet down stacked piles and the surrounding ground once or twice daily during dry weather.

**Size and Separation of Piles**

Stacked Piles—Limit piles to 20,000 cords.

Stacked piles should preferably not be over 200 feet wide, but if monitor nozzles can be located so as to reach any part of the surface of the piles, the maximum width may be 250 feet.

Limit height of piles to 90-100 feet.

Maintain a clear space of at least 100 feet between piles, and the same or greater clear space between piles and main buildings.

Ranked Piles—Keep individual piles as small as practicable and away from each other. Provide a 100-foot clear space between groups of piles totaling 20,000 cords, and divide each 20,000-cord group into two groups of 10,000 cords each by a 50-foot clear space.

Maintain a clear space of 100 feet between piles and main buildings.

## ◆ Announcement of National Standardization Program

Through co-operation between the Department of Commerce and the American Standards Association further progress is being made in the development of a unified national standardization program in a single movement equally representative of Government, industry and the general public. The Government will encourage the extension of the work of the Association and the utilization of its services by industries and groups desiring to establish standards. Meanwhile, it is realized that the facilities, experience, and contacts of the Bureau of Standards are valuable in the continuation of work on Simplification and Commercial Standards.

In order to utilize these values this new plan provides for co-operation between the Bureau, on its reduced basis, and the American Standards Association.

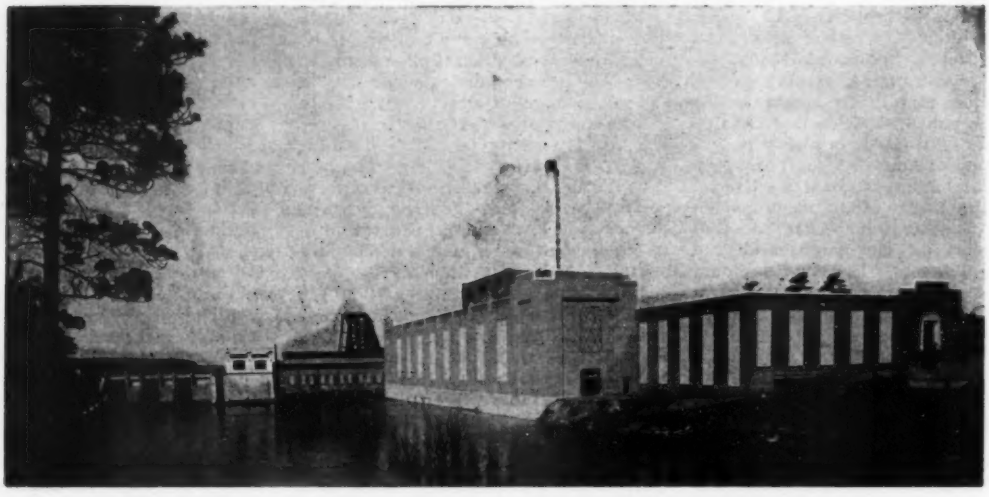
## ◆ Fifteen Million Horsepower in U. S. Hydro Plants

According to the annual report of the U. S. Geological Survey, the total capacity of water wheels at waterpower plants in the United States on January 1, 1934, was 15,913,451 horsepower. This is an increase during the year of 95,500 hp.

Five states show an increase of more than 10,000 hp., while one state shows a decrease of over 10,000 hp. It is estimated that water wheels with a capacity of 80,000,000 hp. would be required to make use of all the potential water power in the United States.

# Fundamentals of Paper Mill Lighting

By W. S. HADAWAY, Illuminating Engineer
Westinghouse Lamp Company



Windowless paper mill of Blandin Paper Company, Grand Rapids, Minn.

ELECTRIC lighting is only as old as the incandescent lamp. During the some 55 years light bulbs have been in general use, artificial illumination progressed with the growth of recognition given it in every walk of life. Where in years gone by lighting was wrongly regarded as playing second fiddle to daylight illumination, modern thinking takes an opposite point of view. We are beginning to realize that illumination from the sun—a source of light millions of miles away—can never approach the control possible with artificial sources near at hand.

In this paramount question of lighting, the Blandin Paper Company of Grand Rapids, Minnesota, has taken the lead among all industrial companies with a windowless mill. In this building, daylight is entirely excluded as an aid to vision. Records indicate that this is the only complete windowless factory building in operation today.

The windowless factory has long been advocated by lighting engineers as ideal from a standpoint of illumination. Color, direction, and intensity of light—factors which are continually varying in daylight—are brought to a status of definite control by artificial means. From an economical point of view, the initial cost of a lighting installation in a windowless structure would be no greater, since the lighting would be no better than that recommended for present-day industrial structures. Operating costs would be higher, however, because the lighting system would be in constant use. But there would be compensating factors in cheaper and more efficient heating and ventilating; in lower construction costs through the elimination of windows; and in the many benefits of health, safety and production efficiency accruing when men work under the best of lighting.

### Suiting the Eye

Much of the new thinking in regard to industrial illumination may be attributed to a more sensible point of view. Formerly, factory lighting problems were solved in the direct manner of installing reflectors and lamps haphazardly and by rule of thumb. Since the eye is the ultimate judge of light, we find modern lighting installations planned from the eye back to the light source after the manner of working simple problems in mathematics backwards from the solution to the formula.

First, we determine how much light the eye requires for accurate and comfortable vision on any one industrial process, then we install our lighting accordingly. Until recent years, we must admit that lighting was somewhat intangible. So far as the layman was concerned it could not be placed on a definite basis in respect to seeing ability. Now, however, by means of new light meters which are veritable light thermometers, the plant engineer may tell just how much light falls on any working plane and then, from pre-determined standards, know where his illumination falters.

Last year a committee of prominent lighting authorities and optometrists met to determine how much light the eye required to function most efficiently. In regard to work illumination, as in all manner of industrial plants, the following levels of lighting were established:

| | |
|---|---|
| Minimum good practice at present | 15 foot candles |
| Minimum recommended levels | 30 foot candles |
| Probable levels of greatest economic advantage | 50 foot candles |
| Possible desirable levels from eye consideration only | 300 foot candles |

To many, the level of 300-foot candles may seem extraordinarily high, yet outdoors we are accustomed to intensities varying from 1,000 to 10,000-foot candles.

To meet the demands of good vision in any industrial plant, lighting falls in two general classes: local and general. Briefly, general illumination is designed to provide an even distribution of light throughout an entire room where the tasks are routine and do not require close vision. Local lighting is an individual light source mounted close to one particular spot. It builds up the intensity there as much as two or three times that of the general illumination and in that way safeguards the vision of workers in tasks that require precision seeing over long periods. When local lighting is used it should always supplement a good level of general illumination.

In the paper industry the great size of

the machines calls for illumination of a general nature. Yet in many instances, the light sources are brought close to the certain areas on machines, where tenders and operators must concentrate their attention constantly, so that their vision might easily be impaired under inadequate illumination. In planning the industrial lighting installation, however, we must determine how much light is required. Only then can we specify lamp wattages, type and size of reflectors, and the spacing and mounting height of light sources.

**How Light Is Measured**

Illumination is measured in foot candles, which are units of light, just as degrees are units of temperatures and inches units of length.

With the small, inexpensive light meter actuated by a photo-electric cell, the measurement of light is reduced to a simple procedure. No batteries or lamps are required to operate these meters and they need never be re-calibrated unless damaged by improper usage. Direct readings in foot candles appear on a scale which resembles that on a voltmeter or ammeter. To measure the illumination on any machine or work bench, the meter is merely held at that point and the reading taken from the scale. Thus the plant electrician or plant engineer on his jaunts through the mill may check the lighting in any room on the spur of the moment.

To check the illumination with a light meter the photo-cell or target should be held at that point in a plane where the light strikes the object of vision, or against that surface where the worker's vision is concentrated. Should that object be a horizontal surface, such as a workbench or a pulp belt, the instrument should be held in this plane when read. If the object of vision be in a vertical plane, such as calender stacks, and the sides of paper-making machines, the light meter should be held against that surface.

When we speak of lighting of 10 foot candles, we mean that illumination obtained by averaging a number of readings at different locations in a horizontal plane 30 inches above the floor, such as on the work benches in a finishing room. Choosing a plane of illumination at 30 inches, which is approximately waist high, assures good lighting for all operations in the pulp and paper mill as few, if any, jobs requiring close vision fall below this level. Unless otherwise stated, all illumination data mentioned hereinafter will refer to the average illumination on this horizontal plane.

Over a period of years, the Illuminating Engineering Society has gathered voluminous statistics on industrial lighting, and from these have arrived at good lighting intensities for all classes of industrial operations. These intensities are operating values, that is, they apply to measurements of the lighting system in ordinary use and not simply when the lamp and reflector are new and clean. Lighting intensities recommended for pulp and paper mills are as follows:

Beaters and Grinders.... 6 foot candles
Calendering .....10 foot candles
Finishing, Cutting and
Trimming .....15 foot candles
Fine and Medium Storage.10 foot candles
Rough Storage..... 3 foot candles

These lighting intensities are considered good practice as based on the eye demands of workers. Not only should they be followed in the new installation, but they should also be maintained properly by regular cleaning and relamping schedules. Illumination levels for other processes may be taken from the above figures for comparable operations.

**Design of the Lighting Installation**

In planning a lighting installation, the first step is to determine the amount of light required as governed by the particular operation, keeping in mind that the finer the work, the more illumination required. Next, the size of lamps and the spacing and mounting heights at which they will give a desired level of illumination must be determined.

The spacing is governed largely by the permissible mounting height of the lighting unit. In general, it is more economical to use large lamps on wide spacings because fewer fixtures and lamps are required and installation costs, therefore, are less. Also, as the wattage of lamps increase, their efficiency in light output per watt of electricity consumed becomes greater.

With the equipment most commonly used, namely RLM Reflectors and the Glassteel Diffusers, the spacing should not exceed 1½ times the mounting height, if an even distribution of light is to be obtained. If, for example, RLM reflectors to give general illumination in the machine room, are mounted 16 feet above the floor, then they should not be spaced more than 24 feet apart. When an industrial area is divided into bays, the units are generally arranged symmetrically with respect to the bays.

Various levels of illumination, as determined by lamp sizes with corresponding spacings and mounting heights, follow definite specifications as set up in the accompanying table. The foot candle values given in this table are for average conditions, that is, for fairly light colored ceilings and walls. For dark colored ceiling and walls or very dirty interiors, the foot candle intensities obtained will be lower by 15 to 25 per cent.

Daylight units, to provide an illumination under which samples of pulp or paper can be accurately matched for color, may be used when the natural north sky light grows dim on dark days, or to replace it entirely at night. The illumination produced artificially by the daylight units is constant in intensity and color, irrespective of location and time of day or night.

**Specific Applications**

From beginning to end the manufacture of paper encompasses such a variety

Elliptical angle reflectors mounted in rows over tending sides of machines for overhead lighting. Separate fixtures rise near the wet ends for supplementary illumination

RLM reflectors mounted on the bottom side of steel room trusses give satisfactory illumination for the rough handling in the wrapping and storing of newsprint rolls

**Outlet Spacing and Lamp Size for Industrial Interiors**

| Distance from Underside of Reflector to Floor to be not less than (Feet) | Outlet Spacing not to Exceed (Feet) | Area per Outlet Adequately Lighted (Sq. Ft.) | RLM Reflector Average Foot-Candles | | | | | Glassteel Diffuser Average Foot-Candles | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 Watt | 150 Watt | 200 Watt | 300 Watt | 500 Watt | 150 Watt | 200 Watt | 300 Watt | 500 Watt |
| 7½ | 7¾x 7¾ | 55—65 | 6—8 | 11—15 | 16—21 | 25—34 | 45—60 | 10—13 | 14—18 | 22—29 | 40—50 |
| 8½ | 8½x 8½ | 65—75 | 6—7 | 10—13 | 13—18 | 21—29 | 38—50 | 8—11 | 11—15 | 18—24 | 32—40 |
| 8½ | 9 x 9 | 75—85 | 5—6 | 8—11 | 12—15 | 19—24 | 34—45 | 8—10 | 10—13 | 16—21 | 29—38 |
| 9 | 9½x 9½ | 85—95 | 4—5 | 8—10 | 11—14 | 18—22 | 32—40 | 6—8 | 9—12 | 14—19 | 25—35 |
| 9½ | 10 x10 | 95—110 | 3.5—4.0 | 6—8 | 10—12 | 16—21 | 29—38 | 5—7 | 8—11 | 13—18 | 23—32 |
| 10 | 11 x11 | 110—125 | 3.5—4.0 | 6—7 | 8—10 | 14—18 | 25—32 | 5—6 | 7—9 | 11—15 | 20—27 |
| 10½ | 11½x11½ | 125—145 | 3.0—3.5 | 5—6 | 7—9 | 12—15 | 22—27 | 4—5 | 6—8 | 10—13 | 18—23 |
| 11½ | 12½x12½ | 145—170 | 2.5—3.0 | 4—5 | 6—7 | 10—13 | 18—23 | 3—4 | 5—6 | 9—12 | 16—21 |
| 11½ | 13½x13½ | 170—200 | 2.0—3.0 | 3.5—4.0 | 5—6 | 8—11 | 16—20 | 3—4 | 4—5 | 7—10 | 13—18 |
| 12½ | 14¾x14¾ | 200—230 | 2.0—2.5 | 3.0—3.5 | 4.5—5.5 | 7—10 | 13—17 | 3.0—3.5 | 3.5—4.0 | 6.5—8.0 | 11—15 |
| 13 | 15½x15½ | 230—260 | ..... | 2.5—3.0 | 4.0—4.5 | 6—8 | 12—15 | 2.5—3.0 | 3—4 | 6—7 | 10—13 |
| 13½ | 16¾x16¾ | 260—300 | ..... | 2.0—2.5 | 3.5—4.0 | 6—7 | 10—13 | 2.0—2.5 | 3.0—3.5 | 5—6 | 9—12 |
| 14½ | 18 x18 | 300—340 | ..... | ..... | 3.0—3.5 | 5—6 | 9—12 | ..... | 2.5—3.0 | 4—5 | 8—10 |
| 15½ | 19 x19 | 340—390 | ..... | ..... | 2.5—3.0 | 4—5 | 7—10 | ..... | 2.0—2.5 | 3.5—4.0 | 7—9 |
| 16½ | 20½x20½ | 390—440 | ..... | ..... | 2.0—2.5 | 3.5—4.0 | 7—9 | ..... | ..... | 3—4 | 6—8 |
| 17 | 21¾x21¾ | 440—500 | ..... | ..... | ..... | 3.0—3.5 | 6—8 | ..... | ..... | 2.5—3.5 | 5—6 |

of mechanical set-ups as to tax the maximum flexibility of lighting as accomplished through the use of various reflector designs, lamp wattages, and mounting specifications.

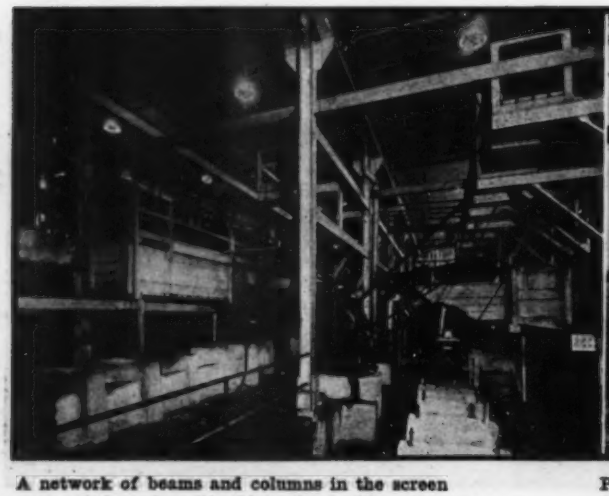
In the sorting room of the rag pulp mills, the eyes of workers are perhaps subjected to greater strain than in any other operations, exclusive of the offices. To contribute to speed and accuracy in shearing rags of buttons and hooks and then sorting them according to color and particularly to the kind of material, and still minimize the chances of eyestrain, the lighting should be 10 to 15 foot candles and free from glare. The class of work in the sorting room may well use lighting of better quality than required under rougher working conditions. The Glassteel diffuser type of reflector with its globe of diffusing glass is therefore recommended.

Light sufficient to assure safe working conditions as the men move around the machines is the first consideration in grinder and chipper rooms. The job of turning valves on and off, of observing gauges, and of handling material, places no exacting demands on the eye so that the requirements here may be adequately met with 4 to 6 foot candles of general illumination. High ceilings in grinding rooms generally make it necessary to use the high bay mounting unit designed for this purpose, although RLM reflectors are suitable providing they are not mounted too high. If it becomes necessary in any industrial lighting installation to mount reflectors more than 20 feet above the floor then high bay units should be used as they utilize the light more efficiently at the higher mounting heights.

The size and character of beaters, whether situated in a separate room or in one end of the machine room, may be tended adequately under 4 to 6 foot candles of general illumination. Either RLM or high bay reflectors, depending upon the height of the ceiling, will provide satisfactory illumination. As the beating process today is largely automatic and the operating time pre-determined, operators need not give it constant attention. Hence special lighting to give higher intensities directly over beaters is not necessary.

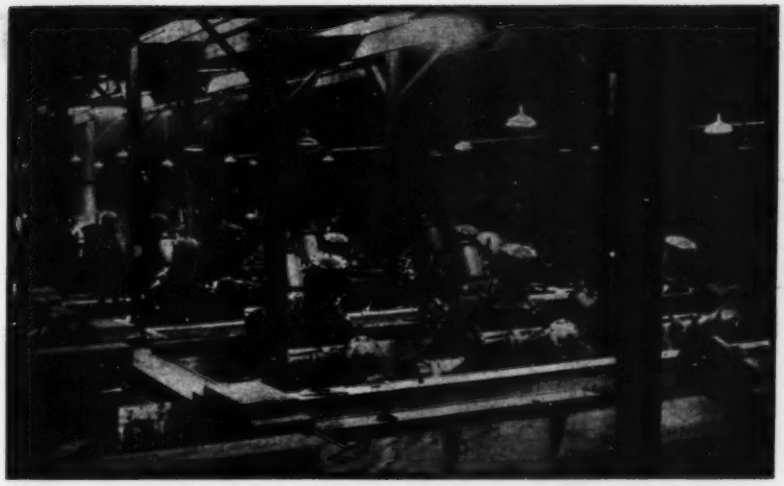
The lighting of paper-making machines is perhaps the most complex of any in pulp and paper mills. There should be 6 to 8 foot candles of general illumination throughout the room so that the workers may move about with ease and speed and thus work efficiently. Wet floors in the machine room give the workers such a precarious footing that good lighting here also helps to minimize the number of injuries from falls. High bay or RLM reflectors are satisfactory for general illumination. In addition, some directional lighting is required on the sides of the machine. Since very little or no light is required above the drying rollers, because of the hood, some installations use angle reflectors mounted over the aisle, approximately over the tending side of the machines. One row directs light to the tending side of the machines on the opposite side of the aisle and vice versa.

Enclosing drying rollers with hoods makes it difficult to illuminate them adequately enough that tenders may observe the pulp sheet at every point during its drying process. Angle reflectors mounted above the center aisle, as previously described, are useless. The only



A network of beams and columns in the screen room of the pulp mill add to the problem of lighting. RLM reflectors with 300 watt Mazda lamps mounted on 15-foot centers provide satisfactory lighting in this installation

Paper machines lighted with RLM reflectors overhead and angle reflectors along wall. Note how the white wall and ceiling builds up illumination, a feature contributing to the distribution of both daylight and artificial light



**Grinder room lighted with RLM reflectors suspended from the ceiling, so as to bring the light sources at a proper height to provide an even distribution of light. This enables workmen to move with ease around the machines**

practical method is to install separate lighting underneath that part of the hood which hangs over the tending side. A row of bare 75 watt lamps mounted on the inside of the hood so that each lamp is opposite the area between tiers of rollers, will distribute ample illumination through the machinery so that the tenders standing below may observe the paper at any point in its drying process.

Of all the locations on paper-making machines, artificial light is needed most at both ends, for it is here that the trained eye of the worker must see that the pulp and finished stock are running true to form. At the wet end, the screen, couch rolls, and press rolls must be illuminated to fascilitate inspection and adjustment. At least 12 and preferably 15 foot candles of light should be maintained at the point where the paper is inspected after leaving the dryers. The vertical face of calenders, the slitters, and the winders, should also receive a high degree of illumination, together with any other machinery present such as weighing scales and sizing tubs. Individual lighting with angle reflectors mounted on the wall nearby or rising from steel members of the machine itself, give good supplementary illumination over the end areas.

In the manufacture of smooth stock paper the calenders should be lighted separately. Since the eye of the operator is constantly observing the work on a vertical plane, the light should be distributed evenly over the calenders. Angle reflectors and 200 watt lamps suspended from the ceiling and offset from the top of the calenders a distance of five to ten feet, will provide good illumination for this work.

The remainder of the finishing room devoted to packing, shipping and storage, requires lighting ample for ordinary handling practice. A good general illumination of 6 to 8 foot candles with RLM reflectors is recommended. If the calenders are situated in one section of this room, the general illumination assures safety and ease of movement around these machines.

At the work benches where it may be necessary to count sheets before packing, the level of light should be considerably higher, namely, 10 to 15 foot candles, than in the remainder of the room as here the eyes of the workers are under strain so taxing as to falter soon under inadequate lighting. Where colored stock in the smoother grades of paper must be given final inspection before shipment, daylight lighting is recommended. There are on the market today a number of special lighting units that will produce any quality of natural daylight desired.

Since a lighting system does not perform any mechanical task in the manufacturing procedure, its importance is frequently disregarded. Unless new motors are oiled and greased regularly in the pulp and paper mill and kept in constant repair, they deteriorate rapidly and too soon fall below their rightful economic value as based on original investment. Exactly the same thing will happen to your lighting system if it does not receive regular maintenance and replacement of burned out lamps. Actually, lighting is the one industrial tool which all operations must use so that any neglect in its character and maintenance must have a degratory effect on the efficiency of industrial procedure.

◆ ◆

## ◆ A Few Gasket Pointers

With lower pressure steam, gaskets may be made of sheet rubber for the reason that with the lower pressure the temperature is also lower, consequently the rubber does not vulcanize so readily. In the selection of gasket material, all too many power-plant owners think only of the initial cost. If this alone is considered, rubber is much cheaper than asbestos; however, rubber does not last as long. The fact that when asbestos is used a joint can be pulled up tight and kept tight, while rubber at each tightening squeezes out and loses its resiliency, makes asbestos the more desirable and in the last analysis, cheaper than rubber for almost all kinds of gasket service.

In the use of asbestos gaskets for steam or water there is only one precaution which should be observed—always make sure that the flanges are drawn up tightly enough to prevent moisture from getting in between the surfaces of the gasket and the flanges. Water will ruin asbestos if much surface is exposed. Packing for low pressure steam should be the same as that used for medium pressure.

For pressures up to 300 lb., gaskets of rubber sheeting give good service. For hydraulic press work, gaskets of hard fiber should be used. The best all-around packing for cold water is square flax, and combinations of rubber and duck also give good service. Tightly braided flax, well graphited, should be used for hydraulic press work.

Gaskets for use on high pressure hot water lines should be cut from hard sheet asbestos. Rubber gaskets may be used with good results on low pressure hot water lines, but as previously pointed out, it is only advisable where initial cost alone must be considered. Observe the same precautions in keeping water from the surface of the gasket as with steam. Packing for hot water service should be made of pure duck or a combination of duck and rubber. Pure duck rings for inside packed pumps are probably the best for either hot or cold water with pressures up to 200 lb. The combination of duck and rubber for stuffing-boxes and outside packed pumps is very reliable. Square flax is used for water packing, and if properly used it is the cheapest and most trustworthy of all material for this service. It should be remembered, however, that square flax undergoes considerable expansion when heated, therefore, it is very poor practice, for instance, to force ⅝ in. material into a stuffing-box requiring ½ in. packing, for trouble will invariably result. Friction will soon cause the flax to become charred and when this happens the pump rod or shaft will be scored if the old packing is not removed at once and new flax inserted. Hot water provides hard service for any kind of packing and extreme care must be exercised if long life is to be expected. The brass sleeves found on many centrifugal pumps should be replaced when worn if the packing is expected to give good results.

◆ A RECENT issue of *World's Paper Trade Review* publishes an item from a Moscow paper to the effect that a Russian committee is seeking a site for a large works for the construction of papermaking machines. It is said the scheme aims at the building of American types of machines which have hitherto been imported. The cost of the proposed works is estimated at 30,000,000 roubles.

# Industrial Plants CAN

By O. V. MORGAN
Horticulturist
Commonwealth Edison Company

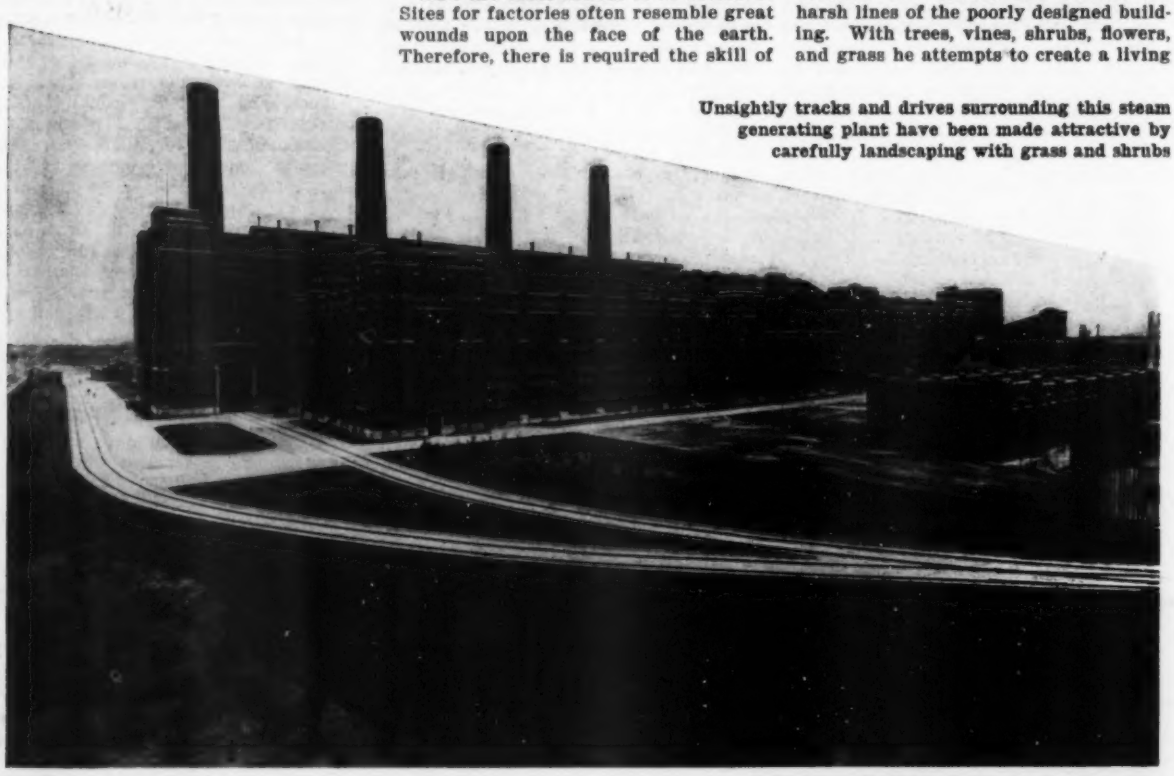
Stone fireplace constructed of crab-apple sandstone from the Cumberland Mountains which was exhibited at A Century of Progress. A practical suggestion for the adornment of an industrial park

THE PRESENT era is deserving of its title, the machine age. Science, research and money have been utilized to achieve the ultimate in the industrial field, that of producing a superior product at a maximum speed and at a decrease in cost. However, in attaining this goal, industry has been accused and, in many cases, justly so, of destroying beauty. It is the purpose of this article to suggest how this accusation may be nullified.

An institution may be ever so efficient in solving its problem of maximum production, but if, at the same time, that institution creates an exterior environment of disorder and unattractiveness, it is failing its community in factors which are quite as important as the production of goods. Products are manufactured for the use and enjoyment of men; they serve to make men's lives more wholesome and satisfying. The factories in which these products are manufactured should contribute to the same end.

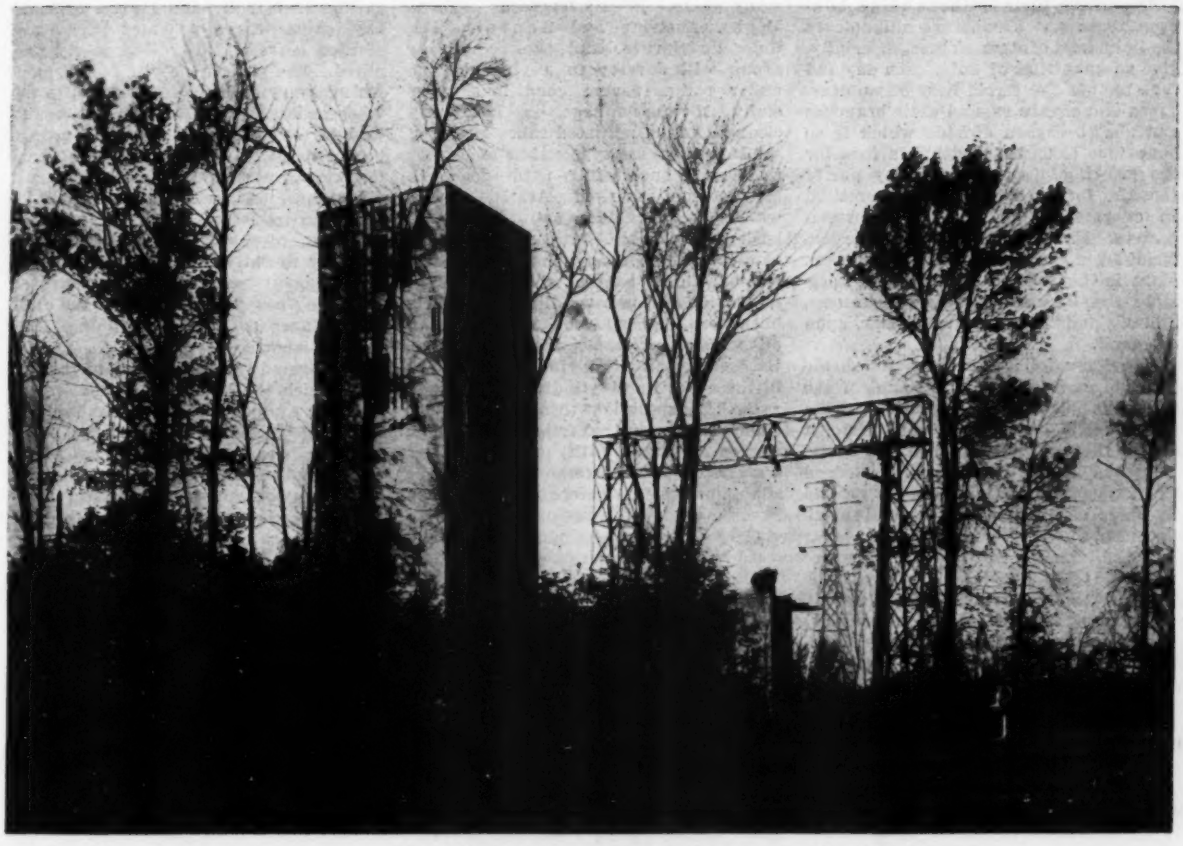
How are these results to be obtained? Sites for factories often resemble great wounds upon the face of the earth. Therefore, there is required the skill of clever architects, landscape artists, and horticulturists to erect a structure in such a manner that harmony and beauty prevail.

The architect, perforce, must design an industrial center with the idea of utility foremost. Because of this factor he may or he may not succeed in making the building truly attractive. At this moment, the horticulturist or landscape artist steps in and, with the use of plant material, enhances the original beauty of the well-designed structure or conceals the defects and softens the harsh lines of the poorly designed building. With trees, vines, shrubs, flowers, and grass he attempts to create a living



Unsightly tracks and drives surrounding this steam generating plant have been made attractive by carefully landscaping with grass and shrubs

# Be Made Beautiful



**Pressure tower constructed by Commonwealth Edison Company in a plot of natural woods not far from the city of Chicago. The rustic beauty of this spot has been carefully preserved and enhanced**

picture which will blend harmoniously with its surroundings.

The landscaper of industrial grounds must necessarily heed several formulas. Like the architect, he must remember not only the fundamentals of good design, but he must adapt his designs to the function of the building. The efficiency of plant management must be maintained. Access to all entrances of buildings and working areas and storage grounds should be laid out in accordance with the principles of greatest efficiency, yet still harmonize with the natural beauty of the surroundings.

Long, sweeping curves in walks and drives are safer and far more beautiful than straight lines and sharp turns. Working areas and storage yards should be placed, if possible, to the rear of the property and should be screened by trees, shrubs, vines, or well-designed fences. It is very important that walks, drives, and fences be correctly designed and be properly constructed of substantial material, for they express safety and stability.

Hedges frequently may be substituted for fences. A tall, background hedge may be planted to shut out unfavorable views; the thorny type may be of protective value on industrial premises; the windbreak hedge may also protect, and the low bordering hedge defines boundaries. A formal hedge requires upkeep and labor but it is usually less expensive than the construction of a fence.

The type of landscaping used is often dependent upon the location of the building in its community and upon the budget which provides for the purchase of necessary material and the maintenance of it.

In the congested district the most suitable means of presenting a neat, attractive appearance may be by the use of cinders or cement; while those which must, of necessity, be built in or near the residential sections should include grass plots, shrubs, trees, and flowers in harmony with their surroundings.

Lawns usually thrive under very severe, adverse city and industrial conditions, and the use of grass reduces the amount of dust and dirt in the factory area. The landscaping plans should be such that, in so far as possible, the lawns will be uncut by walks, drives, flower beds, and shrubbery planting, for there is universal appeal in a smooth, unbroken, velvety bit of greensward. The eye travels with no conscious effort to its margin and there results a mental reaction of peacefulness and tranquility unobtainable by other means. Factory employees deeply apreciate that feeling of spaciousness, even though they may catch only a few fleeting glimpses of it during the day.

Fortunate is the industrial concern that can have vines, trees, and shrubs in addition to the lawn. They are as important to the landscaper in creating a picture as paints are to the painter.

Climbing plants are used to embellish good architecture, to obscure the lines of the poorly designed buildings and to hide unremovable objects. They must be used judicially. A vine may adorn or smother architectural details. A heavy, close clinging type of vine might emphasize the defects of a building, while a finer, more billowy type would soften and camouflage them. Vines are not very expensive and when properly used do for the staid industrial exterior what draperies do for the interior of a home. Trees and shrubs also conceal defects in building design and enhance the beauty of the architecture. They

frame the buildings and blend them into the natural surroundings. A tree adds a touch of nature and an air of dignity that no other thing imparts. Its aesthetic value is enormous.

Aside from their aesthetic value, however, trees and shrubs are valuable to the industrial centers. Trees, especially, give off quantities of water each day and thus temper the torrid heat of summer. Trees and shrubs expand their branches and absorb carbon dioxide which is so obnoxious to us but which is a food for the growing plant. Thus, they purify the air, for carbon dioxide is emitted in enormous quantities in industrial centers. This formation of organic material from carbon dioxide by the green plant is the process which renders possible the life of all other organisms, animals and humans in particular, upon the earth.

The dense foliage of trees and shrubbery seems to deaden the sound of the incessant purring and rumbling within industrial plants. At the same time, it causes the atmosphere to be less dusty. Tons of dust and ashes are collected on the foliage to be washed to the ground by the next rain and thus the air is clarified of impurities.

Not all plants can adapt themselves to the adverse growing conditions to be found in an industrial center. Material, then, must be selected which not only is of the correct height, shape, and form, but it must be a type that can withstand soil with inadequate or excess drainage; that can exist in an atmosphere polluted with more or less poisonous gases and laden with hot ashes and oily soot. Experiments have proved that plants with thick, shiny leaves are more apt to thrive under these conditions.

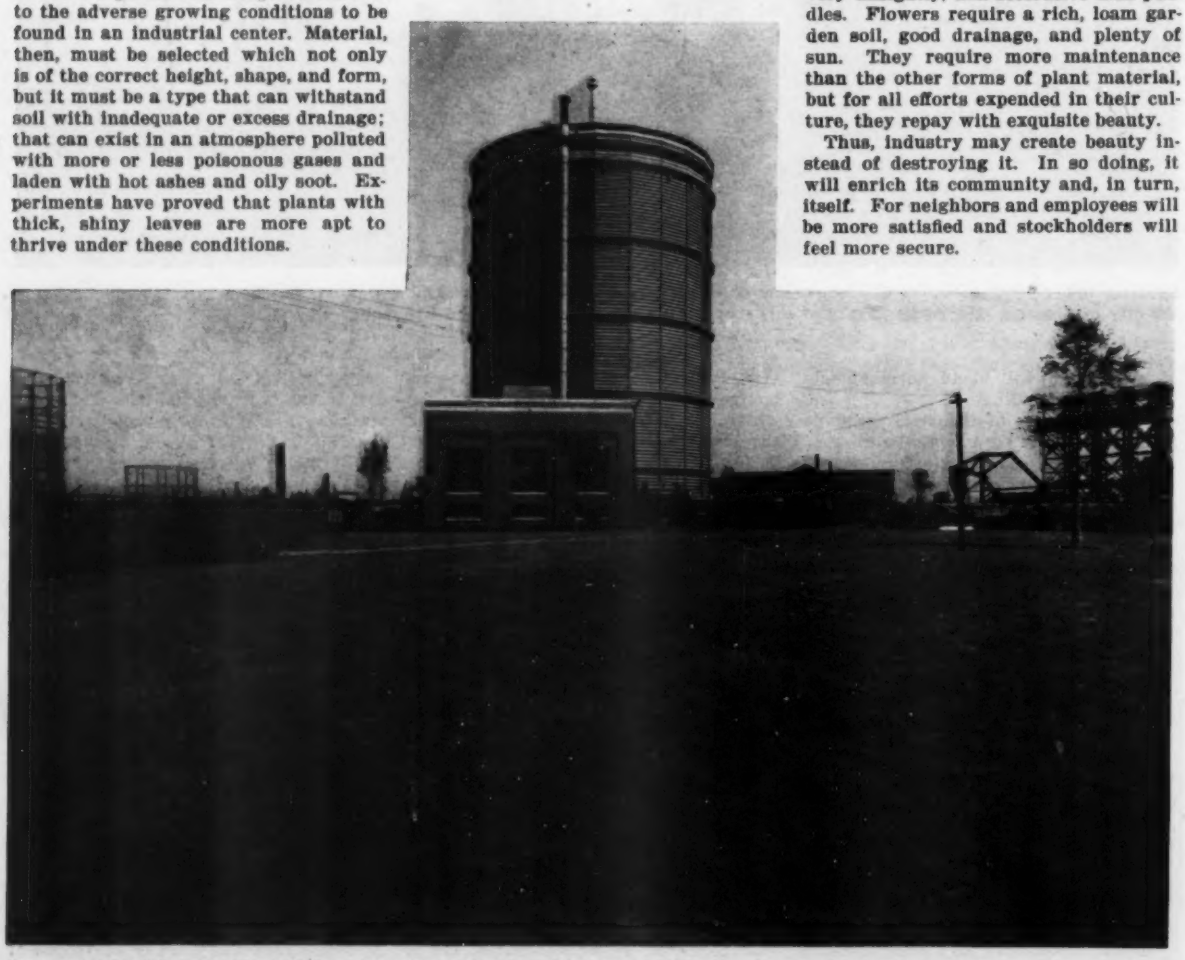
Ailanthus (Tree of Heaven), Norway Maples, Locusts, Elms, Lombardy Poplars, Ash, Hawthorne, and Willow are trees that have been known to thrive under these unnatural conditions for many years. Even evergreens such as Mugho, Austrian and Scotch Pine, Colorado Spruce, and the red Cedar group will develop to a ripe old age under rather severe conditions, especially if the foliage is frequently cleansed of accumulated ashes and soot.

There is a large selection of shrubs that can be successfully used—dogwood, mockorange, five-leaf Aralia, devilswalking stick, golden bell (forsythia), bush honeysuckle, Japanese barberry, bladder-senna, indigo bush, pearlbush, shrub althea (rose of sharon), native Amur River privet, lilac, ninebark, buckthorn, jetbead, smoketree, Russian olive, European elder, tamarisk, weigelia, sumac, and the viburnums. Each of these has its own individual habit of growth, adaptability to soil conditions, color and texture of foliage, hardiness, degree of susceptibility to disease and insects. A little forethought as to the adaptability of the plants to be used often saves materially in maintenance.

Once in place, the plantings should receive proper care in order to encourage a natural healthy growth. Healthy growing plants resist insects, diseases, and other adverse conditions. Growing plants placed in a well drained, good garden loam soil should grow without any great care, provided they are planted correctly, in soil properly prepared. The plant food will need replenishing every year or so in order to develop good growth. Commercial or natural fertilizers may be used to advantage. Water plays a very important part in plant growth and is needed in great abundance. This is more especially true near industrial centers, due to high evaporation. Weekly heavy water is far superior to daily light watering. Automatic sprinkling systems have proved especially beneficial because of the close resemblance to natural rain and they save in labor costs.

Flowers add life and color to the picture which the horticulturist desires to create. Annuals, biennials, and perennials are used chiefly in border plantings. It is to be emphasized that flower beds should not be placed in the center of the lawn of industrial premises. They not only ruin the expanse of green but, during the winter months, the beds are very unsightly, non-decorative mud puddles. Flowers require a rich, loam garden soil, good drainage, and plenty of sun. They require more maintenance than the other forms of plant material, but for all efforts expended in their culture, they repay with exquisite beauty.

Thus, industry may create beauty instead of destroying it. In so doing, it will enrich its community and, in turn, itself. For neighbors and employees will be more satisfied and stockholders will feel more secure.



Storage tank of Peoples Gas Light & Coke Co. Note the wide expanse of grassy lawn, proving that plant material will grow in surroundings where the air is filled with gas fumes

# POWER

## GENERATION + UTILIZATION + MAINTENANCE

**This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.**

By W. S. JOULE

### ◆ Load Variation and Power Station Efficiency

It is characteristic of electric power stations that the output of electricity per 8-hr. shift, or per day, is very variable. In the case of steam plants whose sole duty it is to act as standbys to hydroelectric installations, the variations of output during equal periods of time are enormously greater, for one day the station may be doing nothing whereas on the next it may be called upon for its maximum output should there be ice in the hydro plant or trouble on the transmission lines.

This variation in output introduces certain difficulties in station management which are quite apart from those connected with successfully coping with the loads. Every engineer is concerned to run his station efficiently and there is no better check upon operation than a continual comparison of the results obtained. A direct comparison, however, between the fuel consumed per kw.-hr., or the water evaporated per lb. of fuel on different shifts, may be highly misleading. It would certainly not be fair to expect the men who produced every kilowatt hour for, say 1.8 lb. of coal during a shift when the output was 200,000 kw.-hr., to do the same on a shift when the output is only 50,000 kw.-hr. An ordinary station has a variation of output per shift at least as wide as this, while in a stand-by station the maximum output may be fifty times or more the minimum output over equal periods of time. Under such conditions it is of great importance to be able to eliminate, in some way, the effect of the variation in load, so that a true comparison can be made between the efficiency of operation on any shift and that obtained on any other. Only thus can an improvement or the reverse be definitely ascertained and proper credit be given to the men responsible. Experience, moreover, abundantly shows that when a true measure of operating efficiency is instituted, so that no section of the operating staff is unfairly handicapped by the apparently high consumption figures obtained when the load is small, the natural emulation between the shifts of workers rapidly brings about an all-around improvement in results.

In a foreign power station the output per shift during a certain period varied from 30,000 kw.-hr. to over 230,000 kw.-hr. The coal consumption as stated in the ordinary way was about 3.57 lb. per kw.-hr. for shifts with the lower output, and improved to about 1.8 lb. per kw.-hr. during shifts when the higher outputs were obtained, varying between these limits according to the output. These two figures, although one is apparently nearly twice as good as the other, are really equally satisfactory under their respective conditions, as they both conform equally well with the standard of efficiency ascertained for the station. The operators, therefore, who are using over three pounds of coal per kilowatt-hour may have reason to be quite as proud of their performance as those who produce a kilowatt-hour for less than 2 lb. of coal, and the engineer in charge can allocate praise or blame where it is deserved. The test of efficiency is not the actual consumption per kilowatt-hour, but the conformity of this figure, whatever it may be with the standard efficiency line of the station.

The greater the range of output between the various shifts in a station the more important it is to determine the standard efficiency so as to be able to make fair comparisons between the different results. It is, therefore, quite necessary to arrive at some basis of comparison between the coal and steam consumption obtained in a power station during shifts when the outputs are unequal. The confusing effect of load variation is, of course, greatest in stand-by stations. These, however, are consequently few, but the effect is quite pronounced enough in every ordinary power station to render any method of eliminating it highly desirable. Inequality of output is the most disturbing factor in a station where the operating conditions are uniform, and the practical advantage of finding a method which enables this factor to be disregarded, so that all shifts can be compared on a uniform basis is obvious. Under these conditions bonuses on efficiency can be fairly established, each shift of men being rewarded according to the results they obtain, independently of the performance of other shifts.

### ◆ Meters Cut Steam Costs

A case is on record where the introduction of steam meters in order to charge the steam used to each operating department led to such an interest in steam usage that it was possible to avoid the installation of a new boiler, and finally to shut down the spare boiler which it had been previously necessary to keep in almost constant use. The department heads were no longer indifferent to leaky traps on the steam coils, poor insulation on steam pipes, the excessive use of steam in manufacturing processes, etc., for all of the steam used by the department had to be paid for and reflected itself in the cost sheet as uneconomical performance. Not only did the operating department head take an interest in the amount of steam used, but also in the cost of steam. So it followed that the head of the steam department soon found it necessary to know why the cost of making steam was high. Then came the installation of steam meters on each individual boiler unit, and the measurement of coal to each unit so that evaporating efficiency could be determined. Draft gage, $CO_2$ recorders, etc., of course, followed, for without them the reasons for low evaporation could not be known, but only guessed.

The important thing to remember is that intelligent cost keeping is sure to produce a demand from within the department for the introduction of scientific record keeping which will explain variations in cost, whereas the introduction of scientific methods without first stimulating an interest in economy of operation usually arouses suspicion.

◆ A SLIGHT ADJUSTMENT of speed in a shunt- or compound-wound motor may be accomplished by shifting the brushes; movement in a direction against the rotation causes an increase of speed, and vice versa. Too great a movement may interfere with good commutation. A greater increase in speed may be accomplished by weakening the field or by increasing the air gap by removing shims under the pole pieces.

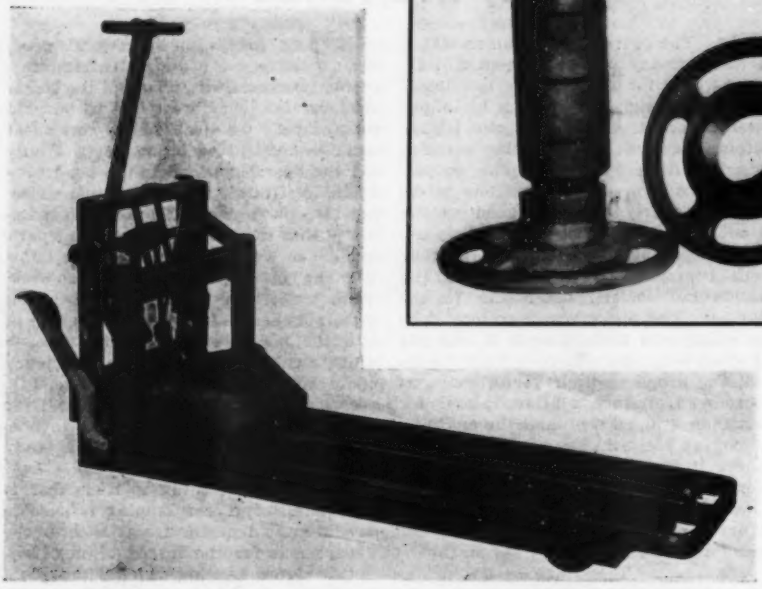
### ◆ Brush Pressure Should Not Be Excessive

Brush pressure upon commutators should not exceed 5 lb. per sq. in. Generaly tensions of 2.5 to 3.5 lb. per sq. in. are used on commutators and 3 to 5 lb. per sq. in. on the slip rings of alternating-current machinery. An experienced operator can frequently determine the tension or pressure with which the brush bears against the commutator by slightly raising the brush in the brush holder. For the inexperienced man, however, it is preferable to test the brush tension by means of a small spring scale. In making these determinations care should be exercised to see that the brushes work freely in their holders.

Opposite brushes should be offset so as to bear upon different parts of the commutator, to prevent wearing a groove in the latter. As far as possible, the entire surface of the commutator should be rubbed by brushes.

### ◆ Paper Lift Truck

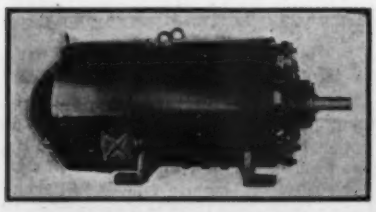
The Lewis-Shepard Company, Watertown, Station, Boston, Mass., has developed a new Universal paper lift truck, which, it is claimed, will quickly and easily lift paper on skids varying in height anywhere from 6 in. to 12 in.—the whole range with one jacklift. The upper frame of the truck, when handling



skids over 6½ in. high, is brought up against a skid by depressing a foot lever. From that point a second lifting mechanism is employed to lift the load step by step. The truck is said to be extremely rugged and designed to operate in crowded quarters.

### ◆ Fan-Cooled Explosion-Proof Motor

A line of direct-current fan-cooled explosion-proof motors has been developed by The Louis Allis Company of Mil-



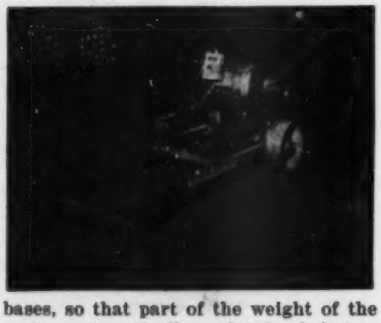
waukee, Wis. The design of these motors permits quick and easy inspection of the commutator and brushes through the removal of only three screw caps.

### ◆ Acree Universal pH Meter

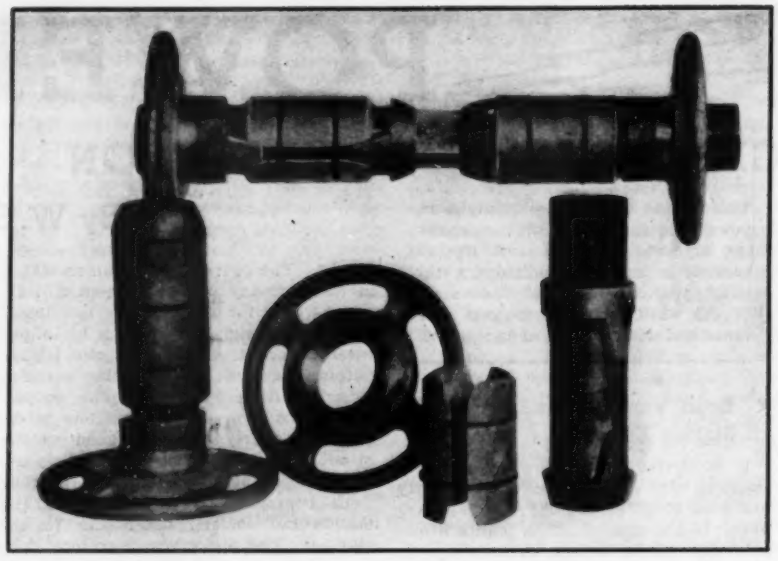
The American Instrument Company, Inc., Washington, D. C., has announced the Acree Universal pH meter as one of their new products. This instrument, according to the announcement, is adapted for use with glass, hydrogen, quinhydrone, or antimony electrodes, and with any type of solution including colored, very dilute, weakly buffered, oxidizing or reducing, and colloidal. In addition, except in the case of the glass electrode with which a sensitive galvanometer must be used, the instrument is entirely self-contained. It is available in two models.

### ◆ Portable Motor Drive Truck

A one-man truck, designed to accommodate practically any standard make of electric motor from 2 to 10 hp., has been placed on the market by The Rockwood Manufacturing Company, Indianapolis, Ind. The unit consists of a standard Rockwood drive made as a part of a sturdy truck. The motor weight is pivoted, as in all Rockwood standard



bases, so that part of the weight of the motor automatically maintains belt tension. Provision is also made to lock the truck in position so that it will not creep or crawl while the drive is running. It is suggested for use when a motor within the range of the unit breaks down or needs repairs for temporarily driving machines in out of the way locations, or for testing new machines.



### ◆ Medart Paper Roll Chucks

An all-metal paper roll centering chuck has been developed by The Medart Company of St. Louis, Mo., and is now being marketed by them.

The chuck consists of only a few major parts, namely, a torque member with a torque wedge welded to one end and threaded at the other, a sliding wedge which slides over the threaded end of the torque member, two expanding shells with spring keepers which fit over the torque member and are positioned between the torque wedge and the sliding wedge, and a handwheel received by the threaded end of the torque member and which expands the expanding shells when turned down against the sliding wedge.

In using the chucks, one may be permanently set at the right-hand end of the shaft by turning down a set screw. This chuck lines up the paper roll in the desired location on the shaft. The free end of the shaft, with the expanding shells collapsed to their smallest diameter, is then inserted into the paper tube core until the expanding shells are completely inside the paper tube core. Then the sliding wedge, turned back into position, is entered into the expanding wedge space and the handwheel pulled up tightly with a 10 or 12-in. valve wheel wrench. This tightening of the expanding shells automatically centers the tube and grips or "chucks" it into place.

The left-hand chuck is slipped over the extending shaft and positioned in the same manner as described for the right chuck.

The method employed for removing the chucks is self-evident. It is as simple as that of attachment.

### ◆ Finish and Porosity Tester

Williams Apparatus Company, Watertown, N. Y., has announced the development of an instrument for measuring both paper finish and porosity.

Making smoothness or plano-radial

porosity tests with the instrument are said to be as simple and as easy as making Mullen tests with the entire elimination of the human element of personal equation. Once the sample is clamped in the instrument and the test started by pressing a lever, the test proceeds without further attention until the end point is reached. The pressing of the lever releases a falling air compression column and at the same time starts a stop watch. The end point is determined by an electric contact which automatically stops the watch and gives both an audible and visual signal by lighting a lamp that the test is completed.

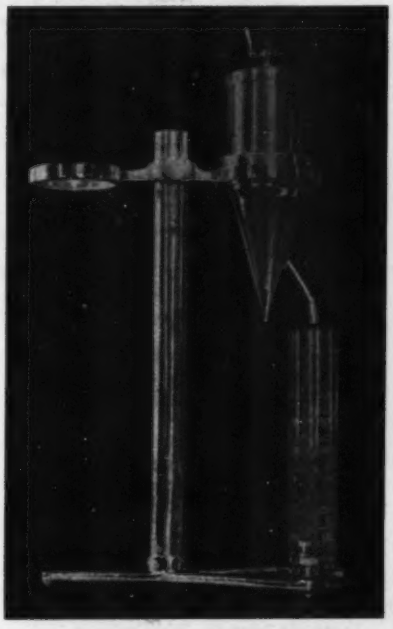
The smoother the contacting surfaces of the paper, the longer the time required to force the measured quantity of air out from between them. On very

smooth papers where the time element might be tedious, the time of the test may be shortened by a simple fixed adjustment which decreases the length of travel of a central falling column without impairing the relative accuracy of the test.

Conversely, on rough or porous papers where the normal time of test is unduly short, the scale may be opened up or the time of test increased by lengthening to a fixed setting the travel distance of the central column.

### ◆ Green's Slowness Tester

A new design of Green's Slowness Tester has been announced by Arthur B. Green of Needham, Mass. In this new design of instrument both the size of the central orifice of the funnel and the hydrostatic head under which it works are standardized. Thus the rate of escape of water through the central orifice is fixed. Should the drainage from the pulp under test exceed this fixed amount, it is permitted to escape through a side orifice. The water caught from the side orifice, measured by volume, constitutes the test.



In details of design the new instrument, according to the announcement, is made to the dimensions recommended by a committee of the Canadian technical section that some years ago undertook to set up a standard slowness test and then selected this instrument as then standardized for making it.

### ◆ Shop Truck and Caster Wheel

A light duty wheel for shop trucks and casters has been added to the line of The Metzgar Company, Grand Rapids, Mich. This wheel, built up of a number of wedges cut from carefully selected hard maple, is constructed without rivets

or metal through the use of a special water-proof and weather-proof gluing process. It is made with any thickness of face, hub length, and bore for axle in diameters from 2½ in. to 10 in. inclusive, and is supplied within this range of sizes with either a plain end-wood bearing or a ball bearing as desired.

### ◆ Blaw-Knox Contactor

A device known as the Blaw-Knox contactor has been placed on the market by the Blaw-Knox Company of Pittsburgh, Pa. The contactor was originally developed as a desuperheater; but experimental and field work revealed through the incorporation of only minor changes in design its possibilities for many new uses.

Fundamentally, the contactor is an engineered device to effect a complete mixing of gas and a liquid. In operation, the turbulence of a miniature tornado or water spout is put to work and the gas forced into intimate contact with the liquid, the device being inherently automatic and adjusting itself to changes in gas flow.

It is being recommended by the manufacturers for gas cooling in one, two, or three stages in a single shell; for gas and air cleaning including the scrubbing of exceedingly fine dust from gas; for chlorination, oxidation, aeration and allied problems where extreme intimacy of contact speeds reactions and increases through-put; for absorption problems which theoretically require not more than three trays or stages of contacting; and, of course, for desuperheating or the automatic elimination of superheat from steam, the purpose for which it was originally designed.

The unit is self-contained with a capacity per unit of cross-sectional area that is said to usually exceed considerably corresponding tower practice.

### ◆ Calender Feed Reduces Loss

A new calender feed which is claimed to largely prevent the losses due to cutting uneven edges of paper, has been developed by the Smith & Winchester Manufacturing Co., South Windham, Conn. An attachment to go on a regular

board calender; it smooths the paper out as it goes between the rolls.

In the mills which have already installed this calender feed, it is stated that the loss due to cutting has dropped from 25 per cent to one or two per cent and, in some cases, even less than one per cent.

## ◆ Rooney Enters Equipment Selling Field

Fred J. Rooney, 326 High St., Lockport, N. Y., for a number of years mill manager of the Upson Company of the same city and more recently associated with Paper Boards Inc. of Chicago, has entered the pulp and paper mill equipment selling field. Mr. Rooney has been active in the affairs of the American Pulp and Paper Mill Superintendents Association, having served the association as its president during 1927 and 1928.

Among the items of equipment that Mr. Rooney is now interested in promoting the use of within the industry is the line of control equipment manufactured by the Merritt Engineering and Sales Co., Inc., of Lockport, N. Y., and known to the trade as the Myers-Mesco line of consistency and viscosity regulators. In addition to this equipment, the new steel cores of the F. W. Roberts Mfg. Co., also of Lockport, and the Wiener rotary stock valves and other Wiener built pulp and paper mill equipment are to be handled by him.

The best wishes of his many friends go with Mr. Rooney in this new business venture.

## ◆ Charles D. Wood

Charles D. Wood, Division Sales Manager of The Grasselli Chemical Company, Cleveland, Ohio, passed away March 20 following a brief illness.

During his 29 years of service with Grasselli, devoted essentially to the development of silicate of soda, Mr. Wood was recognized as one of the best posted men in this field. In this capacity he devoted his entire energy and subsequently contributed much to the successful development of the corrugated and solid fibre box industry.

Mr. Wood is survived by Mrs. Wood and three sons.

## ◆ Hercules Announces New Appointments

Announcement from the offices of the Hercules Powder Co., Wilmington, Delaware, records the election of L. N. Bent as vice president of the company. Mr. Bent, formerly general manager of the Naval Stores Department also becomes a member of the company's executive committee. He has been in the employ of the company since 1914, at which time the company purchased the Independent Power Company of Joplin, Mo. At that time he was superintendent of the Joplin plant.

The company also announces the selection of A. B. Nixon as general manager of the company's Naval Stores Department, to succeed Mr. Bent.

## ◆ W. B. Wilshusen Heads Cameron Machine Co.

William B. Wilshusen, secretary of the Cameron Machine Company, was elevated to the presidency at a meeting of the board of directors held in Brooklyn on March 1st. Mr. Wilshusen succeeds the late James A. Cameron who died last December.

Mr. Wilshusen's association with the Cameron Machine Company, well-known manufacturers of Cameron winders and rewinders, began more than eighteen years ago as advertising manager for the company. Later, as secretary and sales manager, he became well known throughout the paper industry and other lines served by his company.

◆ INGERSOLL-RAND Co., New York City, announces that it has acquired the turbo-blower business of the General Electric Co., and the exclusive rights to the G-E patents in that field. At the company's plant at Phillipsburg, N. J., it will maintain complete facilities for manufacturing; also for servicing G-E blowers now in operation.

◆ ◆

## ◆ New Catalogues and Publications

**Ingersoll-Rand Co.**, Phillipsburg, N. J.—Catalogue No. 7464 is devoted to the Cameron Motor Pump, which is now built in 26 sizes ranging in horsepower from ¼ to 30, and in capacities from 5 to 1,000 g.p.m. The entire line, together with tables of capacities and performance data, is fully illustrated in this catalogue. Large-scale illustrations of the Motorpump are shown in color in a new broadside.

**Johns-Manville**, 22 East 40th St., New York City—"Insulation in the Pulp and Paper Industry" is the title of a new 68-page book in which is described insulation methods that have proved most effective in insulating steam boilers, piping, flues, digesters, rotary pulp boilers, recovery furnaces, paper machines and other heated equipment in the paper mill. A special insulated rot-proof roof for machine rooms is also described. Recommendations cover not only the proper material and the most economical thickness to use for each condition, but also detailed specifications and drawings on methods of application. Copies to those in the industry upon request.

**The Medart Company**, St. Louis, Mo.—This company has recently published a loose-leaf booklet termed The Medart-Timken Engineering Journal, covering in full complete specifications, dimensions, load ratings and other valuable information on the four series of Medart-Timken Bearings which are now being furnished in hundreds of types of standard housings. This booklet makes a handy reference for engineering departments of the consuming trade which have the problem of an application of units of this nature incorporating anti-friction bearings.

**Morris Machine Works**, Baldwinsville, N. Y.—Bulletin 152, just issued, outlines the important advances in centrifugal pump design which within the last few years have vastly improved the efficiencies obtainable with this type of pump, and explains the details of Morris design which characterizes their present standard double-suction split-case pumps. The bulletin also includes many illustrations showing the construction of these pumps, the various arrangements in which they are furnished, typical performance curves and representative installations in industrial plants and municipal pumping stations.

**Plibrico Jointless Firebrick Co.**, Chicago—A new general catalogue covering this company's refractory products is available. The advantages of these products in various kinds of construction are clearly brought out both in the text and the large number of fine illustrations which are profusely used. Copies may be had upon request.

**Westinghouse Elec. & Mfg. Co.**, East Pittsburgh, Pa.—A new leaflet is entitled Single Motor Paper Machine Drive with automatic electronic speed regulation. The operation and application of this drive are concisely explained, and the leaflet contains several illustrations and a list of recent installations in prominent paper mills.

### BOOKS

**Lehr und Handbuch Ueber die Papierfabrikation und Deren Maschinen**, (Ergaenzungaband IIA).—This Teacher and Handbook for the Manufacture of Paper and its Machines, (supplementary volume IIA), by Friedrich Mueller, is a supplementary volume to the original book that was published about 15 years ago. The first volume of this book has later been sent out in a second enlarged edition, and the present volume brings the rest of the book up to the later years developments in the manufacture of paper and cardboard. The book is intended to be used in connection with the previous second volume, but it is nevertheless of great value in itself.

The contents includes: descriptions and explanations of automatic stock meters; the handling of water and stock in wet part of the paper machine; construction and arrangement of wet presses, the dryer part of the machine with drives; the drying of the sheet with the effect and economy of different steam temperature and pressures, surface temperatures of drying cylinders; capacity and thermal effect of drying cylinders; the use of hot air in the drying part; electrical and other drives of the paper machine and calenders; power consumption and how to compute it; power and heat consumption of different calenders; latest arrangement of pressroll on the large drying cylinder on Yankee machines; the effect of additional drying cylinders on this machine; cardboard machines, and the arrangement of the machines in the finishing room, together with heat and moisture control of the air in the finishing room. There are 200 pages and 100 sketches. The three previous volumes, together with this one, makes this probably the most complete work on papermaking available.

The book is published by Güntter-Staib Verlag, Wochenblatt für Papierfabrikation, Biberach-Riss (Wurttbg.) Germany.

**Procedure Handbook of Arc Welding Design and Practice**—This book in a revised and enlarged edition of over 450 pages with several hundred illustrations has been designed to serve as a source of practical information on arc welding and its applications for engineers, welding operators, estimators and others interested in this subject. It includes within its pages descriptions of various welding processes, definitions of welding terms, a classification of welds, methods of stress relieving, tabulations of speed of welding all types of joints in all positions, methods for estimating cost of weld production, and specifications for steels and alloys of good weldability, together with material covering strength of welded joints, structures and properties of weld metal, welding non-ferrous metals, comparison of limitations of rolled steel and cast iron in machine design, and construction details of basic machine parts built by welding. In addition, there is very extensive treatment of typical applications of arc welding in manufacturing, construction and maintenance.

The book, 5¾ in. x 9 in. and bound in semi-flexible simulated leather embossed in gold, is published by The Lincoln Electric Company, Cleveland, Ohio. It is priced at $1.50 per copy within the United States.

## Dun & Bradstreet Report Paper Industry Improved

DUN & BRADSTREET, INC., New York, issued an analysis of the condition of the paper industry under date of March 24, from which the following excerpt is taken:

**Paper Industry on Way to Profitable Year**

After passing through three years of declining values and volume, a trend which was not checked until the second quarter of 1933, paper companies generally now have achieved a position which assures a more rapid rate of expansion. The new year has started with production as well as prices far above the low levels prevailing early in 1933, and all branches are to be benefited further by the codes which promise the elimination of the price-cutting mania, which all but destroyed the industry a few years ago. Average volume during the first quarter ranged from 35 to 40 per cent over that for the comparative 1933 period, demand covering nearly the entire range of papers, with bond and rag leading. The quick recovery of the wrapping paper division has been little short of phenomenal, and is indicative of the spreading improvement in general business activity.

The steadily increasing volume during the last six months of 1933, together with the higher prices, enabled a number of firms to show profits at the close of the year, while in other instances losses were curtailed for the first time in four years. Although the market is not quite so steady as it was last fall, indications point to a more accelerated movement during the next few months, with the largest gains to be recorded for the better grades of paper. In marked contrast to the situation last summer, speculation is almost entirely absent, buyers holding commitments to actual needs. Orders are increasing each month, however, and the already advanced level of prices has assured a good inventory appreciation as the spring season progresses, according to a survey of the paper industry, which has just been completed by Dun & Bradstreet, Inc.

**Mill Operations Expanding**

Volume of pulp and paper production is 20 to 50 per cent ahead of that of a year ago, and is maintaining the pace set by the general recovery movement. Manufacturers in the Northwest report steady capacity schedules which have been maintained for the last eight months. Factory employment is increasing, now being 25 to 35 per cent larger than in March, 1933, with prospects for more frequent additions to pay rolls in the near future. Specialties are being produced in quantities as high as 100 per cent over last year's, while general purpose wrapping papers, especially kraft, are nearly double the shipments of that period. Fruit wrappers are being turned out in quantities fully 50 per cent above last season's, in anticipation of an unusually good yield in various fruit districts.

While production of newsprint in the United States in 1933 declined to 946,374 tons from 1,006,569 in 1932, or a drop of 6.2 per cent, the increase in the output of Canadian mills to 2,017,004 tons in 1933 from 1,907,566 the previous year, or a gain of 6.2 per cent, and larger contributions by mills of Mexico and Newfoundland enabled a small increase to be shown for the year. For the total North American output of newsprint in 1933 was 3,250,579 tons, as compared with 3,207,291 tons in 1932, an increase of 1.3 per cent.

Since the first of the current year, production of newsprint has been increasing. January output for the United States and Canada was 26 per cent larger than in January, 1933, and in February the gain was 28 per cent, with the total production of 247,000 tons marking the largest February output in four years. In the paper board division, which is one of the largest classes in point of tonnage, output has receded from around 75 per cent of capacity in the third quarter of 1933 to about 70 per cent of capacity, but current orders indicate wider operations in the next few weeks.

During the latter half of 1933, prices advanced rapidly and rather abruptly in many instances. It is estimated that common grades and low grades of fine paper are up 40 to 50 per cent and high grade fine papers from 10 to 25 per cent from the 1933 comparative level.

YOU'D BUY IT AGAIN AND AGAIN, TOO

Paper mill men made it popular—ARMCO SPIRAL WELDED PIPE. We had little to do with the growing demand except to point out the money-saving features of our pipe, mostly in advertisements and letters. It's easy to explain why ARMCO PIPE is the *mail-order pipe* of the paper industry. Superintendents and engineers know that it measures up: that it can be obtained quickly; that it goes in fast and cuts installation costs; that its proved durability and smooth inner walls keep down costs.

There's no speculation, no uncertainty, in ordering ARMCO SPIRAL WELDED PIPE; and this is the reason why 57 leading mills buy it again and again. You also can, with profit. Just send us your inquiries or specifications to the address below.

THE AMERICAN ROLLING MILL COMPANY

*Executive Offices:* Middletown, Ohio

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The heavy-duty Langston Slitter can be had in any width, to wind any diameter. Use it as a winder or as a rewinder. Speeds up to 3000 feet per minute. Makes rolls of uniform density, square-edged. Langston's Shear-Cut makes no dust—the paper is *clean-cut, not ground* apart. A catalog is yours for the asking.

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HUDSON-SHARP Machine Company

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Green Bay . . . . . Wisconsin

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**100 TON BOARD MILL**

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**Western Board and Paper Company**

AT KALAMAZOO, MICHIGAN

One seven cylinder combination board machine trimming 100" of 85 to 100 tons daily capacity. Pumps and constant speed are motor driven, balance engine drive.

One four cylinder machine trimming 66½" of 15 tons daily capacity. Pumps and constant speed are motor driven, balance engine drive.

1 Breaker Beater. Engine or Motor drive.

10 Beaters—7 Engine and 3 Motor driven.

7 Jordans—5 Engine and 2 Motor driven.

Power Plant of 2,000 Boiler h. p., Stoker operated—1,000 Engine h. p.—400 k. v. a. Electric.

Complete Machine Shop.

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**ASSISTANT MANAGER FOR COATED PAPER MILL,** preferably with technical training. Must have had extensive experience in handling operating problems and demonstrated ability in handling men. Reply giving age, education, training, experience, previous salary and salary expected. Enclose small photo if convenient. Address Box 217, THE PAPER INDUSTRY.

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Railroad Duster, capacity of 30 tons 24 hours, Ledger Papers.

Lancaster type 4 cylinder washer, capacity 20 tons or better, slow stock.

Decker 36' or 48' cylinder by 82' to 110' face.

Wet Machines, capacity 15 tons 24 hours, 30% dry slow stock or 15 tons 47% dry.

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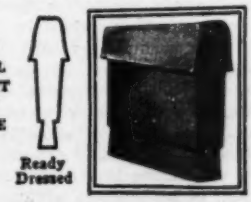

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## ◆ Tentative Outline of Superintendents Convention Program

**Wednesday, June 20th—Play Day**

Morning—Golf, Fishing, etc., Mill Visits.
Noon—Luncheon.
Afternoon—Golf Tournament and Sports, Examination of Exhibits.
Evening—Sport Jamboree, Speakers, Entertainment, Presentation of Sports Prizes.

**Thursday, June 21st**

Morning—Official Opening of Convention, Papers, Examination of Exhibits.
Noon—Luncheon, Speaker.
Afternoon—Papers, Examination of Exhibits, Group Meetings, Entertainment.
Evening—Dinner, Speaker.

**Friday, June 22nd**

Morning—Papers, Discussion and Question Box.
Noon—Luncheon, Speaker.
Afternoon—Continuation of Discussion, Business Meeting and Election of Officers, Examination of Exhibits.
Evening—Banquet, Speaker, Presentation, Past President's Jewel; Presentation, Paper Mill Trophy; Presentation, Eastwood Golf Cup; Dancing.

Rates—$6.00 per day, room without bath; $7.00 per day, room with bath.
All meals included in these rates.
No extra charge for Luncheons or Banquets.
Registration Fee—$3.00 for members and non-member superintendents; $8.00 for sales representatives.
Golf—$1.00 for 18 holes.

The foregoing program of the Fifteenth Annual Convention of the American Pulp and Paper Mill Superintendents Association, to be held at Poland Springs, Maine, merely gives a glimpse of the good time in store for all who attend the big event at Poland Spring House, South Poland, Maine, on June 20, 21 and 22 next.

Recent changes in the tentative program by K. E. Terry, general convention chairman, and his corps of sub-chairmen indicate that no business sessions or group meetings will be held in the evening. This leaves the evenings on all three days clear for entertainment.

And no program, not even the official program, will contain a hint of the several splendid "surprise" features that will be sprung during the convention. In addition, Mr. Terry has prepared an informal program for Tuesday, June 19th, a day on which many members and guests will arrive. This program will include the showing of moving pictures on fishing and hunting in the State of Maine.

More than half of the spaces for exhibition of equipment and machinery at Poland Spring House have been sold at this early date, and it is advisable that all machinery and equipment concerns who wish to secure exhibition space send in their reservation soon. You will note on the program that definite time has been allotted on Wednesday afternoon and on Thursday morning and afternoon for examination of the equipment and machinery exhibited. However, the exhibition booths are in such a splendid spot that nobody attending the convention can possibly miss seeing them. All the exhibition rooms are in the big corridor which connects the main lobby of Poland Spring House and the main assembly room.

There will be a Costume Dance Party on Thursday evening at the end of which prizes will be presented to the ladies and gentlemen who are voted to be the most novel or the funniest.

Throughout the convention a ten-piece modern orchestra will be on hand to entertain.

Attention is again called to the low hotel rates and low registration fees in effect for this convention. And for the entire week the Poland Spring House will be used exclusively by the Superintendents and their guests.

For the golfers it is well to mention that the splendid 18-hole course is part of the property surrounding the Poland


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*U S S Chromium-Nickel Alloy Steels are produced under the licenses of the Chemical Foundation, Inc., New York, and Fried. Krupp A. G. of Germany.*

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5. Exceptional ductility, and twice the strength of ordinary steel.
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8. Produced with unrivaled facilities, by the largest manufacturer of tubular products in the world.

For digester relief lines, heater coils, pulp stock lines, bleaching tank piping, and similar services where corrosion of equipment or discoloration of product leads to excessive operating or maintenance costs. NATIONAL engineers and metallurgists will gladly aid in determining the most effective application of the U S S 18-8 alloys to specific service requirements.

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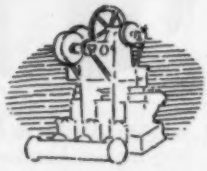

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May we quote you on Fan pumps, Post stuff pumps and Duplex or Triplex stuff pumps? Bulletins will be sent on request.

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Spring House. The first tee is immediately outside the locker rooms in the basement of the hotel.

Reservations for this convention are coming in a goodly number. It would be wise for all who plan to attend to send in their reservations without delay. George W. Craigie, Executive Secretary, Box No. 36, Cumberland Mills, Maine, stands ready to answer all questions regarding hotel reservations, transportation, special trips, golf, other sports and machinery and equipment exhibition spaces.

## The Paper Industry Safety Contest

**July 1, 1933, to June 30, 1934**

**Scores as of February 28, 1934 (Cum.)**

**8 Mills Still in the Race**

**PERFECT SCORES**

**Division I—Paper and Pulp Mills**

| | PARTICIPANT | MILL | LOCATION |
|---|---|---|---|
| GROUP A | | | |
| GROUP B | St. Croix Paper Co. | Woodland | Maine |
| GROUP C | | | |
| GROUP D | The Upson Co. | Lockport | New York |
| | Bird & Son, Inc. | Roofing Plant | Chicago |
| | International Paper Co. | Riley | Maine |
| | Hollingsworth & Whitney Co. | Abenaquis | Madison, Me. |
| | Spaulding Fibre Co., Inc. | Hayes | No. Rochester, N.H. |

**Division II—Remanufacturing**

| | | |
|---|---|---|
| Container Corp. of America | Natick | Massachusetts |
| Southern Container Co. | Houston | Texas |

**IMPERFECT SCORES**

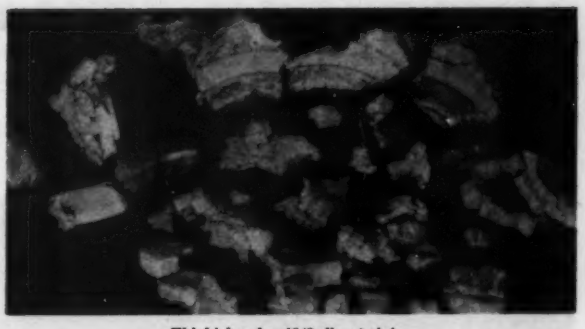
| | Key | Rank | Points Credit | Points Debit |
|---|---|---|---|---|
| GROUP A | PB- 9 | 1 | 870.552 | |
| | PA- 6 | 2 | 853.082 | |
| | PA-17 | 3 | 822.106 | |
| | PA-11 | 4 | 704.358 | |
| | PA- 5 | 5 | 680.626 | |
| | PA- 2 | 6 | 671.552 | |
| | PA- 1 | 7 | 616.136 | |
| | PB- 5 | 8 | 569.126 | |
| | PA- 8 | 9 | 501.390 | |
| | PA- 3 | 10 | 450.230 | |
| | PA- 4 | 11 | 403.210 | |
| | PB- 2 | 12 | 250.194 | |
| | PA-12 | 13 | 59.610 | |
| | PA-15 | 14 | | 88.250 |
| | PA-13 | 15 | | 160.002 |
| | PA-16 | 16 | | 185.400 |
| | PA- 9 | 17 | | 560.330 |
| | PA- 7 | 18 | | 587.174 |
| GROUP B | PB- 6 | 2 | 875.406 | |
| | PC-10 | 3 | 733.366 | |
| | PB- 7 | 4 | 713.950 | |
| | PB- 1 | 5 | 653.190 | |
| | PB-15 | 6 | 651.778 | |
| | PC- 7 | 7 | 585.450 | |
| | PB- 3 | 8 | 568.144 | |
| | PB-16 | 9 | 360.240 | |
| | PC- 9 | 10 | 343.170 | |
| | PB-11 | 11 | 275.526 | |
| | PB-13 | 12 | 80.614 | |
| | PB-14 | 13 | | 0.360 |
| | PB- 4 | 14 | | 181.182 |
| | PC- 2 | 15 | | 421.158 |
| | PC-19 | 16 | | 1,605.152 |

**DIVISION II**

| | | | | |
|---|---|---|---|---|
| GROUP C | RB-1 | 3 | 898.870 | |
| | RC-1 | 4 | 864.322 | |
| | RD-4 | 5 | 752.074 | |
| | RC-4 | 6 | 642.802 | |
| | RD-1 | 7 | 628.350 | |
| | RC-5 | 8 | 596.605 | |
| | RD-5 | 9 | 572.392 | |
| | RD-6 | 10 | 384.630 | |
| | RC-2 | 11 | 269.370 | |
| | RC-3 | 12 | 161.650 | |
| | RD-7 | 13 | | 1,168.482 |
| | RD-3 | 14 | | 1,661.448 |

| | Key | Rank | Points Credit | Points Debit |
|---|---|---|---|---|
| GROUP C | PC- 6 | 1 | 900.280 | |
| | PC-25 | 2 | 783.368 | |
| | PC-22 | 3 | 691.778 | |
| | PD-28 | 4 | 656.818 | |
| | PC-15 | 5 | 591.986 | |
| | PC-14 | 6 | 580.824 | |
| | PB-10 | 7 | 570.350 | |
| | PC-11 | 8 | 434.394 | |
| | PD-13 | 9 | 404.712 | |
| | PD-25 | 10 | 373.418 | |
| | PC-24 | 11 | 372.872 | |
| | PB-17 | 12 | 256.880 | |
| | PC-27 | 13 | 248.350 | |
| | PC- 8 | 14 | 245.440 | |
| | PC-23 | 15 | 203.890 | |
| | PC-18 | 16 | 116.650 | |
| | PC-21 | 17 | 107.486 | |
| | PC- 4 | 18 | 10.786 | |
| | PC-12 | 19 | | 181.340 |
| | PC-16 | 20 | | 242.384 |
| | PB-18 | 21 | | 1,014.418 |
| | PC- 3 | 22 | | 1,027.314 |
| | PC-26 | 23 | | 1,119.094 |
| GROUP D | PD-15 | 6 | 784.024 | |
| | PD- 9 | 7 | 742.986 | |
| | PD-24 | 8 | 731.600 | |
| | PD- 1 | 9 | 708.318 | |
| | PD-27 | 10 | 661.776 | |
| | PD- 6 | 11 | 579.566 | |
| | PC-20 | 12 | 545.278 | |
| | PD-26 | 13 | 500.566 | |
| | PD-17 | 14 | 451.648 | |
| | PD- 7 | 15 | 435.608 | |
| | PD- 3 | 16 | 407.992 | |
| | PD-18 | 17 | 342.726 | |
| | PD-14 | 18 | 51.938 | |
| | PD-12 | 19 | | 184.800 |
| | PD-20 | 20 | | 375.918 |
| | PC-13 | 21 | | 393.918 |
| | PD- 8 | 22 | | 431.962 |
| | PD-29 | 23 | | 1,007.422 |
| | PD-11 | 24 | | 1,047.608 |
| | PD- 2 | 25 | | 1,300.712 |

No February Report: PA-14.
No January or February Report: PB-8.
Withdrawn: PA-10; PB-12; PC-5; PC-17; PD-21; PD-22; PD-23.

*This high carbon 18/8 alloy steel ring failed in hot sulphite liquor service because of intercrystalline corrosion.*

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# TECHNICAL DEVELOPMENTS

## IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

**The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.**

### ◆ Automatic Paper Machine Regulator

The object of the invention is to obtain an automatic regulation of the machine that insures the formation of a sheet in which there is a definite weight of paper per unit area. In Figure 1, the pulp suspension (a) leaves the box (b), over the wire (c), between the rolls (d) and the wet-press rolls (e) and (f). The device (g) which is a special type of balance, is also equipped with a roll over which the paper passes during the formation of the sheet. Guiding the paper between (e) and (f) is so controlled that (g) is influenced only by the weight, and not by the pressure or tension of the sheet. If the latter, in process of formation, has the desired weight, the lever arm of (g) rests midway between the contacts (h) and (i). A contact device disc (k) acted upon by the wet press (f) is in series with contact (l) of the balance (g), and, at predetermined, definite time intervals (k) is electrically charged. The relation of the speed of the machine and its transmission to the endless screw (p) are so synchronized that the contact disc (k) makes one complete revolution while the sheet travels over the distance (q). Connected with (h) and (i) are two electromagnets, (m) and (n), through which the ratchet wheel (o) is induced to turn clockwise or counterclockwise, one gear tooth at a time. Through suitable me-

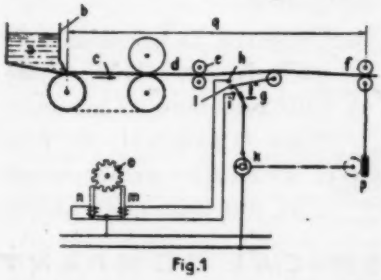


Fig.1

chanical and electrical devices, (o) governs the speed of the paper machine. If the sheet is too heavy, the roll of (g) is inclined downwards, and contacts (l) and (h) are closed. If the corresponding contacts of (k) are also closed, (m) receives a current which displaces (o) counterclockwise. This increases the speed of the machine. Immediately thereafter, the current through disc (k) is broken, and (m) allows its armature to fall back. If the increase in the speed of the machine is then sufficient, the balance beam of (g) again takes its mid-position and the contact between (h) and (l) is broken. If, however, the sheet is still too heavy, the contact between (h) and (l) remains closed, although the electromagnet is not affected until the circuit is again closed by (k). The object of this lag is to prevent a further increase in the speed of the machine until the paper produced under the new conditions has actually been weighed on (g). If the sheet is too light, the electromagnet (n) functions and (o) moves in the opposite direction, thus slowing the speed of the machine. Figure 2 shows an arrangement for further sen-

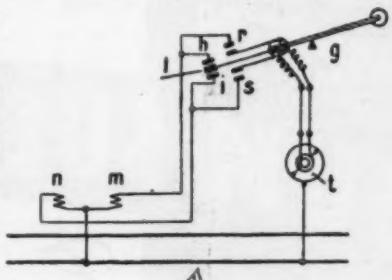
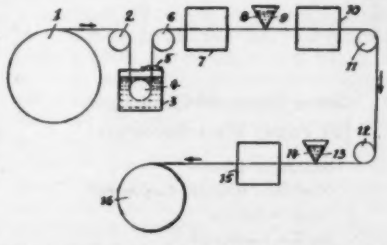


Fig.2

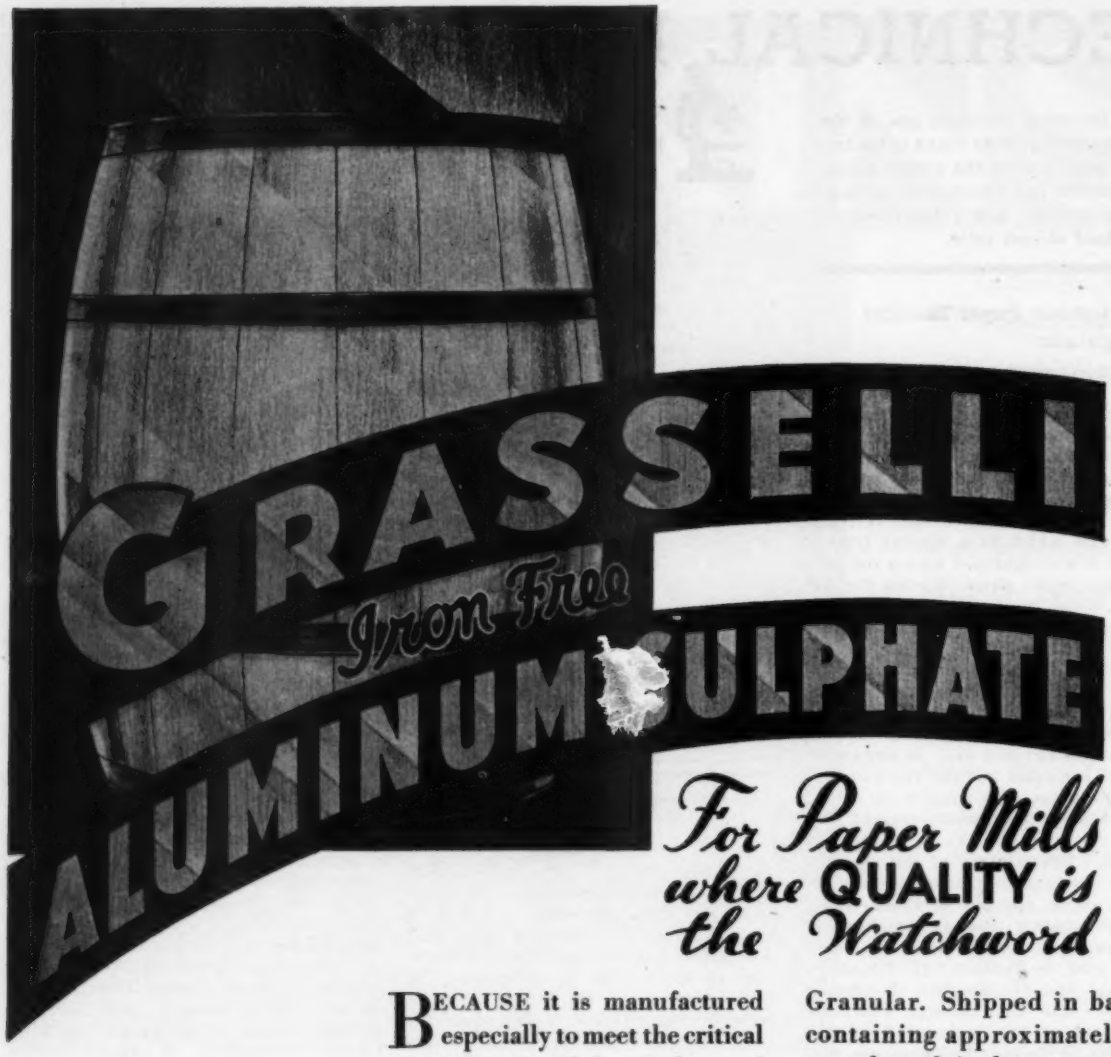
sitizing the speed mechanism. Here the beam (g) following any variation in the weight of the forming sheet may close either one or two contacts. In the case of great weight variations, the second contact (r) (or (s)) is set up in parallel with (h) or (i). The wheel (t) is so connected that it then gives two or more impulses in the same time interval in which a disc (like (k) in Figure 1) would function. Hence (o) moves more rapidly. Finally, in order to obtain even greater sensitivity, the direct beam contacts of (g) may be dispensed with entirely. Instead, the balance beam may carry a disc with a slit in front of which is placed a source of light and on the other side of which are two photoelectric cells. One of these, acting through an amplifier and a delicate relay, causes the ratchet (o) to move counterclockwise, while the other moves it clockwise. Similar or analogous devices may be used in regulating the flow or thickness of stock. Société anonyme Brown, Boveri et Cie, and Henri-Jean Francois Brenton. French Patent No. 755,231.

### ◆ Moistureproof Paper

The sheet, printed or unprinted, is first passed through a bath of some wax dissolved in a suitable liquid hydrocarbon or mixture of hydrocarbons, with the concentration of the solution kept at 10 per cent or below. The solvent is removed at 50 deg. C., and the sheet is subsequently coated on one or either side with nitrocellulose containing a natural or artificial resin, and then subjected again to 50 deg. C., for removal of the solvent. The permeability of the paper to moisture is always expressed in milligrams of water per hour, per square centimeter, at 24 deg. C. The wax alone has practically no effect on moistureproofing. Thus a paper showing an initial permeability of 0.56 mg/hr./cm², after impregnation with a 10 per cent solution of paraffin (melting at 150 deg. C.) in naphtha, showed a permeability of 0.57. The effect of a subsequent treatment with 16 grams nitrocellulose in an admixture of 8 grams of dibutylphthalate 4.8 g. of ester gum, and 84 grams of a mixture of 20 per cent ethyl acetate, 30 per cent alcohol, and 50 per cent toluene, showed a permeability of only 0.0031. Numerous other examples are given in the patent, and the quantitative permeability data are tabulated. The waxes used are (primarily) paraffin, beeswax, candellila wax, and spermaceti. Wax solvents were (primarily) toluene, naphtha, and other petroleum fractions. The plasticizers were (primarily) dibutylphthalate, diethylphthalate, tributyl phosphate, triphenylphosphate, castor oil, o-cresyl toluenesulfonate, etc. Among the resins used were (mainly) the ester gums, the cumarone and indene resins, the phenol-formaldehyde resins, and sandarac. The nitrocellulose solvents included suitable mixtures chosen from the following: ethyl acetate, ethyl alcohol, acetone, toluene, benzene, and naphtha. (Actual composition of these mixtures are given in the patent.) Although nitrocellulose is specifically mentioned,




other cellulose derivatives, like the acetate, propionate, and the cellulose ethers may be used, but the moistureproofing is found less effective. While the per cent of wax in the original solvent does not affect the final permeability appreciably, the per cent of plasticizer in the nitrocellulose solutions is of marked importance. In the figure, the paper is unrolled from 1, passing over guide roll 2, through the wax impregnating-bath 3, over guide roll 4, between scrapers 5, over a guide roll 6, through a warm chamber 7 (kept at 50 deg. C.). The nitrocellulose coating

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equipment is represented by the feeding box and spreaders 8 and 9. The paper passes through the drying chamber 10, over guide rolls 11 and 12, under another feeding box and spreader 13 and 14, which coats the under side, through a warm drying chamber 15, and over the winder 16. Societé Kodak-Pathé, Seine, France. French Patent No. 754,614.

### ◆ High Temperatures in the Sulphate Cook

The fifth of a series dealing with the soda and sulphate processes. Frequent experiments to the contrary notwithstanding, there seems to be no marked advantage in cutting the maximum digestion temperature below 170 deg. C. No marked increase in quality or yield of pulp resulted. Under these milder conditions, Scotch pine pulp (70 years old) showed a slightly higher tearing length and bursting strength than did spruce (130 years old). Differences in the moisture content of the chips apparently did not affect the strength of the resultant pulp. In the cooks, the digestions were carried out to a mean Roe number of 7.0, and a very uniform wood and good circulation of liquor were used. Erik Hägglund and Ingman Eidem. Svensk Pappers-Tidn. 36,632 (1933); through Papier-Fabr. 32, No. 3, 34 (1934).

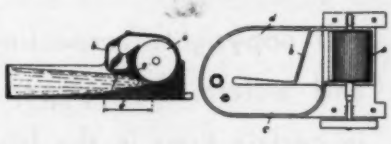
### ◆ Acetylation of Wood Pulps

For the preparation of useful acetyl celluloses, a highly purified, easily permeable pulp is essential. In these experiments, the wood was pretreated with an alkaline earth solution, prior to the sulphite cook. In this way a special grade of sulphite pulp was prepared, and the total operating time was only increased 18-20 per cent above the normal. The additional costs were trifling (about 0.4 marks per 100 kilograms). The pulp, after nearly complete drying, was very finely shredded, special care being taken to avoid small lumps. Thereupon, by the use of a conditioning chamber, the moisture was increased to 20 per cent. This serves to decrease the time required in the acetylation and to increase very materially the strength of the product. The reaction time was further decreased by adding sulphuric acid and sodium acid sulphate (as catalysts) directly to the water with which the dry shredded pulp is moistened. The swelling action of the water is evidently a requisite, although other agents that also cause swelling were not favorable towards hastened acetylation.

Despite his satisfactory results, the author shows that exhaustive large scale experiments must be carried out before definite conclusions may be drawn regarding the competition of wood pulp with cotton linters as a raw material in acetate manufacture. By using the ordinary acetylation technique, it was impossible to reach directly the theoretical acetyl content of a triacetate, i. e. 62.5 per cent acetic acid. Although on occasion it was possible by especially drastic methods to reach this figure, the quality of the product suffered in consequence. With the exception of their solubilities, the properties of the samples isolated directly from the original acetic acid solutions were normal. A partial saponification of the wood cellulose acetates carried out to that point at which they became soluble in acetone required the same length of time as did a similar partial saponification of cellulose triacetate. Partially saponified wood cellulose acetates were, in general, soluble in a greater variety of solvents than was the product derived from the triacetate (saponified to the same acetyl value). Ethyl acetate containing methanol or ethanol proved an especially good solvent. Small scale wet-spinning experiments with fibers of wood cellulose acetate showed noteworthy properties. F. Ohl. Kunststoffe, 23,226 (1933); through Papier-Fabr. 32, No. 6, 68-9 (1934).

### ◆ Beater

The beater roll (a), the width of which is greater than its diameter, is placed in an unusually elevated position and serves to convey the stock over the top of the roll in the short conical mixing chamber (b), which has a sloping floor where it empties into the relatively narrow channel (c). This in turn widens beyond the unsymmetrically placed midfeather into the larger partition (d). The floor of (c) rises rather abruptly through (e) to the elevated bedplate.



The outer, lower wall of (b) inclines sharply downwards in the direction taken by the beaten stock and in this way serves to form the upper wall (g) of the funnel leading to the beater roll. This arrangement permits the installation of the motor serving the beater above the outflow channel without adversely affecting the ease of inspecting the layout and without causing impact of the blades against the bedplate. P. J. Wolff u. Söhne G. m. b. H and Hermann Mallickh, Düren. German Patent No. 590,888; Kl 55c.

### ◆ Impermeable Cellulose Product

M. Darrin's new material is described. Plastic paper pulp is forced by air blast against a screen and then dried. Subsequently it is treated with molten sulphur to which diphenyl has been added. The latter causes a lowering of the viscosity of the sulphur solution and permits the pulp to take up quite readily, from 3-5 times its own weight of stable sulphur, thus furnishing a product that is resistant to water and to chemical attack, and which is an electrical nonconductor. It can be easily worked, and gives rise to a number of useful products. Cdn.; Industritidning Norden, 61,271 (1933), through Papier-Fabr. 32, No. 2, 20 (1934).

### ◆ Properties of Wood and Sulphite Production

This gives the viewpoint of the Swedish forester, G. Rinnman, on the relationship between the properties of wood and its usefulness in the manufacture of sulphite pulp. The structure of the wood often has an influence on the quality of the product. The bark of small limbs may be the precursor of impurities in the pulp, and this is true more especially in the case of dense wood, than with wood having wide annual rings. The smaller twigs of this denser wood seem more prone to decay, and it then becomes difficult to remove them completely from the bolt. The adhering bark contaminates the raw material entering the digester. In general, the lower part of the tree trunk gives a less satisfactory product than does the wood higher in the bole, where the limbs are usually healthier. Pulp made from summerwood gives a paper with a greater tearing length than that made from springwood, but the paper from the former is also more brittle. Summerwood fibers appear to be stiffer than those in springwood, and paper made from the latter may show as much as a 40 per cent higher folding endurance. The quality of the paper is thus directly influenced by the ratio of spring- to summerwood. Wood with wide annual rings, indicative of a relatively high springwood content ordinarily gives, soft, nonbrittle, but strong paper, and the stock from which such paper is made is often whiter and cleaner. Strong unbleached sulphite is usually obtained in about the same yield from either spring or summerwood, but, in the case of bleached sulphite, the yields from summerwood are lower. Heartwood gives yields averaging 44 per cent of pulp as compared with sapwood of the same species (not given) which furnishes 48-50 per cent. Wood taken from the crown of the tree gives lower pulp yields than those obtained from the middle portions of the trunk. Basing his data on American experiments, Rinman states that if the rate of penetration of the cooking liquor into spruce chips with narrow annual rings is taken as 100, the rate, in the case of wood with wide rings approximates 180, that of slightly decayed wood is 900, and extensively decayed wood approaches 1500. The relationship between width of annual rings and dry wood substance may vary widely. Loss on barking is difficult to correlate with the dimensions of the bolt, since small dimension stuff does not necessarily give rise to the greater losses. Logs of large diameter frequently carry more branches while smaller bolts are often straighter and freer from knots. Of marked importance in estimating the amount of wood substance in a cubic meter of wood are: the number of limbs and the uniformity of the bolts. Dense wood may have up to 20 per cent higher dry weight, and in general shows smaller losses on barking than does porous wood, but the former never showed more than 4 per cent higher pulp yields than did the latter. Hard, dry, dense wood gives

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pulp yields of only about 41 per cent (as shown by Norwegian pulp mills). The most serviceable wood, viewed from the botanical, technical, and economic standpoints is that having annual rings about 2 mm. in width and with a dry weight of about 360 kg. to the cubic meter. Gustav G. Klem, Papir-J., 21,126 and 144 (1933); through Papier-Fabr. 32, No. 2, 20. (1934).

### ◆ Cellulose Ether and Ester Sheets

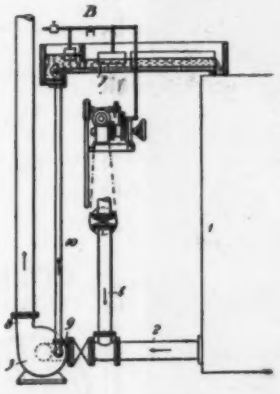
The comparative properties of cellulose acetate (C.A.), cellulose nitrate (C.N.), ethyl cellulose (E.C.), and benzyl cellulose (B.C.) have been studied and the derivatives have been rated and evaluated on the basis of certain of these. In chemical resistance, E.C. and B.C. rate equally, and take precedence over C.A. and C.N. In transparency C.N. stands 1st, C.A. 2nd, B.C. 3rd, and E.C. 4th. The decreasing order of resistance to heat is: C.A., E.C., B.C., and C.N. In resistance to light, E.C. ranks 1st, C.A. 2nd, C.N. 3rd, and B.C. 4th. In resistance to water, C.N. and B.C. stand together at the top, followed by C.A. and finally E.C. In tensile strength, the rating is: C.N. 1st, C.A. 2nd, E.C. and B.C. 3rd. In elasticity the order of rating is C.N., C.A., E.C., and B.C. The stretch is highest in the case of B.C., with E.C., C.N. and C.A. following in the order listed. The order of solubility (with solvents not listed) from highest to lowest is: E.C., C.N., B.C., and C.A. The esters are less colored than are the ethers. Only in the case of celluloid could the combustibility of C.N. be partially decreased by the addition of calcium sulphate by the Trolite process. In judging water resistance it should be borne in mind that the order of permeability to liquid water may be quite different from that to water vapor. In order to render hydrated cellulose sheets more resistant to water, or water vapor, C.N. and B.C. coatings may be profitably used. While the lacquer industry requires low viscosities, manufacturers of sheets and films demand high viscosities. The tear resistance is normally highest in C.N. sheets, with C.A., E.C., and B.C. following in the order named. The article discusses specific branches of industry in which the cellulose derivatives are used. V. Mienes and G. von Frank. Z. angew. Chem., 46,583 (1933), through Papier-Fabr. 32, No. 3, 32-3 (1934).

### ◆ Latex in Paper and Board

By adding 4 per cent latex in the papermaking process, increased resistance to mechanical wear and tear and improved appearance are obtained. In board manufacture, an average of 40 per cent latex may be introduced. Because of its greatly increased resistance to mechanical abrasion, such board is suggested as a building material. Latex also finds uses in wall paper, bookbindings, and in the production of insulators. T. L. Garner. Kunststoffe, 23,109 (1933); through Papier-Fabr. 32, No. 3, 32 (1934).

### ◆ Removing Water From Pulp

The stuff from tank (1) is pumped upwards to a screen by means of the centrifugal pump (3) through conduit pipes (2) and (8). Pipe (4) conveys an amount of water as diluent that is definitely regulated by the device B, which is adjusted by the density of the stock itself. Since the requisite amount of cellulose required by B is so small a part of the liquid suspension, the pipe line (10) that leads to channel (7) has a relatively small diameter. Consequently larger particles in the pulp, like small twigs, etc., might easily cause a stoppage of this pipe. To prevent this, line (10)




runs directly upwards from the pump casing to (7) and is so placed that the blades are very close to the outlet (9) with the result that the rapidly revolving blades serve to remove or break up the larger particles. Aktienbolaget A. E. Ekströms Maskinaffär, Stockholm. German Patent No. 590,837, Kl. 55d.

### ◆ Barking by Steam

The steam treatment may be carried out in a small drum (1 meter in diameter and 4 meters in length) and requires a steam pressure of 4-6 kg/cm² and an exposure of 5-6 minutes, in the case of air dry, half barked, spruce wood. Damp wood requires somewhat more time. When the steam pressure is raised to 6-7 kg/cm² and the time of treatment extended to 10 minutes, the wood may be discolored. Dried wood responds best to steam barking. Immediately after the treatment, the pressure within the drum is suddenly released, and the bark is blown clear of the wood. If an occasional operation, as described above, fails to remove the bark completely, hand treatment of the logs as they are being conveyed to the chipper will suffice to remove the additional bark. The author also discusses the methods of air drying prior to barking, the steam intake and outlet, and the costs per cubic meter of wood. The hourly output of a drum of the type mentioned is about 18 cubic meters of barked wood and the steam consumption is about 50 kg. per cu. meter. Harold Korpi. Pappers-Trävarutid Finland, 15,-684 (1933), through Papier-Fabr. 32, No. 3, 34 (1934).

### ◆ Alfol Roofing in Paper Industry

This covering material is aluminum foil, prepared by the Dyckeroff method. Its advantages which include lightness in weight and relative cheapness make it a fitting material for covering buildings that house paper machines; roofs which are now ordinarily supplied with so-called Rabitz undercovering (Unterdecken). E. Belani Oestr. Zentralbl. Papierind., 51,105, and 152 (1933); through Papier-Fabr. 32, No. 3, 35 (Jan. 21, 1934).

### ◆ Sulphur Consumption in the Sulphite Cook

This is the 27th paper on the chemistry of the sulphite digestion. The sulphur consumption (and by this the authors mean the S which cannot be recovered) is of three types: sulphuric acid, loosely bound sulphur, and firmly bound sulphur. The formation of sulphuric acid during the early stages of the digestion is due to air trapped in the wood and the digester. With increasing amounts of $SO_2$, and especially with increasing lime content in the liquors, the formation of sulphates is favored. Sulphuric acid formation accounts for about 20 per cent of the total sulphur consumption. Loosely bound sulphur dioxide changes with the free $SO_2$ content of the liquor. When the calcium content is high the loosely bound sulphur diminishes. This appears due to a diminution in sugar content, with which the loosely bound sulphur is largely linked. Of the total sulphur consumed in the process, the loosely bound portion usually forms about 20-30 per cent. Firmly bound sulphur represents 50-60 per cent of the total consumption. Here the decisive factor is the lime content (i. e. the bisulphite-ion concentration), while the free $SO_2$ is of little influence. In the final stages of the cook the sulphur consumption increases rapidly, due to the firmly bound sulphur that is taken up in the further sulphonation of the soluble lignosulphonic acid, and also, to a lesser degree by the formation of sugar sulphonic acids. With increased lime content, the pulp yield increases, and delignification is more complete. This compensates for the increased sulphur consumption which is always higher when the lime content of the cooking liquor is high. Erik Hägglund and F. Carrick. Svensk Pappers-Tidn. 36,704 (1933) through Papier-Fabr. 32, No. 4, 46 (1934).

### ◆ Determination of Active Chlorine in Bleach Liquors

Potassium antimonyl tartrate (tartar emetic) which can be obtained in highly purified form is suggested as a substitute for antimony trichloride as recommended by Feigel and Schummer. Indigo carmine is used as end-point indicator. Standard stock solutions showed no practical change inside of three years. Justin Hauser; Chem-Ztg. 57,634 (1933); through Papier-Fabr. 32, No. 3, 31 (1934).

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# The COMMERCIAL OUTLOOK

New York, April 2, 1934.

WHILE demand for paper is reported steady in its development, it is reported generally that the market lacks the breadth which paper manufacturers and distributors had expected and hoped for at about this period. The chief complaint within the industry, in fact, is concerning the comparatively light volume of demand, or, to put it more precisely, the failure of demand to attain the scope anticipated.

Most paper mills are managing to keep passably busy. On the other hand, few are rushed. There is scarcely a mill in the industry, so reports say, that could not readily accommodate considerable more business if it was forthcoming. Activity in the paper market thus far this spring has fallen below expectations. On all sides consumers and converters, as well as jobbers, are buying in decidedly reserved fashion; there would seem to be no hurry or incentive to stock up on any large scale, and buyers with rare exception are proceeding to cover their requirements as they arise but show little or no disposition to buy in excess of more or less current needs. Such business as is transpiring is of the healthiest character; it is very evident that paper being bought from mills or distributors is moving almost directly into consumption. However, paper manufacturers would like to see demand reach larger volume.

The paper market situation nevertheless is registering consistent improvement. Business is steadily forging ahead, though the trend forward is slow. The general industrial and business condition is favorable. Statistics for the last several months relating to retail trade, employment, carloadings, and other basic indices have been highly encouraging, showing that general business is still on the mend. The outlook is regarded in most quarters as bright. Some look for a spurt in general business before the summer sets in, and others, equally as optimistic in their views though advancing their predictions somewhat, expect business to show appreciable improvement in the latter months of the year.

Compared with a year ago, current activity in the paper industry is much broader, according to a survey of the industry just made by one of the leading credit and statistical agencies, which states that the average volume of business in paper during the first quarter of 1934 ranged from 35 to 40 per cent over that for the comparative period in 1933, demand covering nearly the entire range of papers, with bond and rag leading. The quick recovery of the wrapping paper division has been little short of phenomenal, and is indicative of the spreading improvement in general business activity; newsprint production has been increasing since the first of this year, the coarse paper market is improving, fine papers are moving in fair quantities, and demand for book and cover papers has become stronger during the past month, the report adds. The report estimates that prices of common grades of paper and low grades of fine paper are up 40 to 50 per cent, and high grade fine papers from 10 to 25 per cent from the 1933 comparative level. The general price level in the industry, the report states, now stands at 10 to 30 per cent above that of March a year ago, with stability strongly in evidence since the adoption of the NRA code.

Production of newsprint in the United States and Canada in February was at the highest level in four years, and Canadian production alone was greater than for any February since 1930, according to figures compiled by the News Print Service Bureau. Production in February was 28 per cent greater than in February last year, with Canadian mills showing a 37 per cent gain. For the first two months of this year production was higher than for any similar period since 1931. February output reached 72,402 net tons in United States mills, against 67,085 tons in the same month last year, and 174,447 tons in Canada, compared with 125,916 tons a year ago. Total North American production in February amounted to 270,358 tons, contrasted with 299,278 tons in the preceding month, and 211,301 tons in the corresponding 1933 month. Shipments of newsprint from mills in the United States amounted to 69,251 tons, against 67,057 tons in February last year, and from Canadian mills 169,054 tons, compared with 120,916 tons a year ago. Stocks of newsprint at U. S. and Canadian mills at the end of February totaled 62,505 tons, including 22,060 tons in the United States and 40,445 tons in Canada, contrasted with a total of 52,495 tons in both countries a month before.

Production of paperboard in the United States during January showed an appreciable increase over the preceding month, totaling 229,180 net tons of all grades of board, contrasted with 176,337 tons in December last and 205,326 tons in January, 1933, according to the U. S. Census Bureau's monthly report. Board mills produced at 57 per cent of their rated capacity in January, against 47.1 per cent in December and 52.3 per cent in January last year. New orders for board received by mills during January called for 217,102 tons, against 169,116 tons in the month before, while unfilled orders held by manufacturers at the end of January were for 63,328 tons, compared with 48,920 tons a month previously. Shipments of board from mills aggregated 186,475 tons in January, contrasted with 152,712 tons in December, and stocks of board on hand at mills at the end of January totaled 75,805 tons, against 64,965 tons a month earlier. These figures are compiled from reports from 94 identical board mills furnishing statistics monthly to the Government.

Prices of paper are exhibiting pronounced stability. Under code arrangements manufacturers are adhering firmly to the quotations issued, and are refusing to grant concessions. The industry was perhaps never so free of price competition as it now is, established prices being fully maintained.

◆ ◆

## ◆ Revere Copper and Brass to Sell Mueller Fittings

Arrangements have been completed whereby Revere Copper and Brass Incorporated will sell and distribute Streamline soldered fittings as manufactured by the Streamline Pipe and Fittings Company, Port Huron, Michigan, a division of the Mueller Brass Company. This will not in any way alter present selling plans of either company as regards other products but will mean that both companies will have these fittings available for sale.

In the plumbing industry, distribution will be through authorized plumbing supply distributors only, which is in keeping with the policies of both companies.

For use with these fittings Revere will market its Copper Water Tube. This is made in three types in accordance with the government and A. S. T. M. specifications for this product, and is known as Revere Copper Water Tube (P R Pipe), Types K, L, and M.

On all types, the outside diameters for the respective sizes are the same so that size for size the same fittings may be used. Revere Copper Water Tubes are made to the close tolerances necessary for the successful use of these soldered fittings.

The Type K is the heaviest weight. It comes in both hard and soft tempers and is intended for underground service and general plumbing purposes where water conditions are severe. Type L, medium weight, is also furnished in two tempers and is used for plumbing and industrial piping. The K and L types may be joined with flared fittings as well as soldered fittings.

Type M, the lightest weight, is intended for piping where water conditions are normal. It is joined with soldered fittings only.

Revere will use its mills as distributing points for the Streamline fitting. These plus the distributing facilities of the Streamline Pipe and Fittings Co. will mean added convenience and service to the trade.

# Domestic RAW MATERIALS

### ◆ Papermaking Rags

There has been a decided quieting of demand for most papermaking raw materials during the last few weeks, and quite unexpected by the trade. Paper manufacturers have retrenched in their buying to a marked degree, and the apparent reason is that they have not been in need of supplies, presumably having accumulated fair-sized stocks and choosing to work off these before operating in the markets as purchasers on a more normal scale.

This does not mean that dullness obtains in rags, old paper, pulp and other materials for papermaking, but it does mean that activity in the markets has failed to assume proportions ordinarily seen at this period of the year. The one exception in this situation perhaps is wood pulp, demand for which is relatively good. Papermaking rags of nearly every grade are much slower, from a market standpoint, than they were up to a short while ago. New cuttings, old rags, roofing stock and just about all descriptions are experiencing a quiet spell; why consuming mills are absorbing supplies in such limited quantities is difficult to determine, but the fact remains the rag market is showing subnormal activity. Manufacturers in numerous cases exhibit very little or no interest in offerings of dealers, others who are buying are doing so in very cautious and restricted fashion, while in the aggregate the movement of rag stock to mills is far short of that usually witnessed at this season.

Prices as quoted have registered little important change. However, most, if not all, of the price revisions have been in a downward course of late. New cuttings of some grades are reported available at slight recessions, yet packers and dealers assert new supplies are coming in slowly, that stocks in their hands are comparatively small, and that any spurt in consuming demand would doubtless promote a strengthening of market values. Generally, dealers are asking 7 cents or slightly more per pound for new No. 1 white shirt cuttings f. o. b. shipping points, 7.75 cents for unbleached muslins, 2.50 cents for fancy shirt cuttings, 4.50 cents for new blue overall cuttings, 4 cents for khaki cuttings, 2.25 cents for No. 1 washables, and 4.50 cents for light silesias.

Roofing rags have eased a bit in market value to where domestic rags of this category are selling in the East at 1.25 cents a pound for No. 1 roofing stock f. o.b. New York, and 85 cents per hundred pounds for No. 2 grade. Foreign roofing is out of the running because prices quoted from abroad are far above those prevailing on domestic rags, imported dark cottons on a basis of at least 1.35 cents a pound ex dock American Atlantic ports and linsey garments 1.60 cents or higher. Old white cotton rags are selling spasmodically on a price level of around 3 cents a pound for No. 1 repacked whites f. o. b. dealers' points, and thirds and blues are reported obtainable at 1.40 to 1.50 cents for repacked, and 1.25 cents for miscellaneous blues.

### ◆ Old Paper

Pronounced quietness characterizes the waste paper market, in both the East and West. The salient cause, it would seem, is that boxboard mills are not as busy as they would like, and are acquiring raw material supplies only in proportion to their more or less actual needs. The result is that, from all indications, too much waste paper is reaching the market even though there is small doubt collections in many large centers have been curtailed. Pressure to sell is making for some easiness in prices, although no broad changes have occurred. Old mixed paper is selling in the East at 25 cents per hundred pounds f. o. b. New York, and in the West at 40 cents, while folded newspapers are bringing 40 cents in the East and 60 cents per hundred in the West. Books and magazines have weakened in price to where No. 1 heavy flat magazines are reported fetching only 95 cents to $1 a hundred pounds delivered mills in the Kalamazoo district, and a basis of 80 cents per hundred in the East f. o. b. New York. Shavings are held relatively firmly, packers in the East asking around 2.40 cents a pound for No. 1 hard white, 2 cents for No. 1 soft white, 2.35 cents for extra one-cut soft white shavings, and 2.75 cents for No. 1 hard white envelope cuttings. Kraft is quoted at 1.20 to 1.25 cents per pound for No. 1 old kraft, and ledgers are firm at 1.50 cents for white and 1.10 cents for colored ledger stock.

### ◆ Rope and Bagging

Demand for bagging is about the liveliest seen in any line of papermaking material. Old gunny bagging is bringing up around 1.60 cents a pound for foreign at American Atlantic ports, and about 1.50 cents for domestic f. o. b. points of shipment, while No. 1 scrap burlap is selling at 1.20 cents and perhaps higher at shipping points. Roofing bagging is around 70 cents per hundred pounds at dealers' points. On the other hand, old rope is in slow call, paper mills seeming little desirous of supplies while presumably having their needs covered for a time, and confining their purchases to occasional commitments to regular suppliers. Domestic No. 1 old manila rope is bringing 2.50 cents a pound at shipping points, and foreign rope around 2.40 cents ex dock basis.

### ◆ Pulpwood

A fairly steady demand of moderate dimensions is reported for pulpwood, though activity in the market is chiefly routine. Prices are reported holding their own, showing little or no alteration.

### ◆ Mechanical Pulp

A steady movement of mechanical wood pulp against contracts is recorded, and it is said consumers are absorbing fair tonnages in the open market. Canadian groundwood is figuring in most sales currently, and is reported fetching $21 or $22 per ton f. o. b. pulp mills across the border or a range of $29 to $33 delivered consuming mills in Upper New York State or other American paper mill centers, depending on the freight and the air dry test. Limited amounts of domestic groundwood are changing hands in the open market, with the price basis in the vicinity of $26 or $27 a ton at pulp mills.

### ◆ Chemical Pulp

While demand for most of the so-called substitute materials is slow currently, the market for wood pulp is comparatively lively. Paper and board manufacturers are taking supplies of pulp freely and in sizable volume; it is reported generally that most domestic pulp mills are well sold up, are not overeager for additional orders for a time, and are maintaining prices firmly on their product. Contracts for pulp have been placed freely by paper manufacturers thus far this year, with the result pulp producers are favorably situated, having their output or most of it sold for some time ahead, and in numerous cases well into the future.

Prices are steady, and, if anything, exhibit a stiffening tendency. Prime bleached sulphite is quoted at established prices of 2.75 cents upwards per pound ex dock Atlantic seaboard basis, some grades ranging up to 2.90 and 3 cents, and higher. Unbleached sulphite is 2.10 cents to 2.20 cents for the ordinary prime grades, and 2.25 and 2.30 cents for the easy bleaching qualities. Bleached soda pulp is on a quotable basis of 2.50 cents a pound delivered book paper mills, while domestic kraft pulp is 1.75 to 2 cents a pound at producing plants.

### ◆ Chemicals

Papermaking chemicals are enjoying a fair demand, while not very voluminous yet is of steady character, with the contract movement particularly consistent. Prices are holding firm, generally on levels established earlier in the year. Bleaching powder is 1.90 cents upwards per pound f. o. b. works. Alum is quoted at 3.25 to 3.50 cents for lump, 3.40 to 3.60 cents for ground, and 3.60 to 3.90 cents for powdered. Domestic casein is 12 cents a pound for the standard ground and 13 cents for the finely ground, with the Argentine product quoted on a range of 15.50 to 16 cents. The 76 per cent solid caustic soda is 2.60 cents upwards at works, and flake caustic 3 cents. Soda ash is priced at 1.05 cents a pound for the 58 per cent light product in bulk.

# Import and Export MARKETS

## IMPORTS

### ◆ Wood Pulp

Paper manufacturers are purchasing wood pulp freely. Reports state that buying in recent weeks has reached broad dimensions, not only have consumers bought readily for shipment from primary sources abroad over the next several months but some have looked far ahead and have placed contracts covering the larger portion of their anticipated needs far into the future, some having bought in large tonnage up to the end of 1935.

Apparently, paper manufacturers view the pulp market situation with confidence, which is to say that they do not expect to be able to purchase their principal raw material at lower prices than now prevail for a considerable time to come. In fact, judging from the heavy buying, it would appear as if some papermakers believe higher pulp costs are probable. At the moment, the tone of prices is steady to firm, and yet there has been no definite change in market levels. It is evident that the tendency is upward and that it is becoming more difficult for buyers to operate at the low edges of quotational ranges, yet prices actually remain in the same position as a month ago. Producers in Europe are growing less eager for orders; this is not surprising when it is understood that a majority of pulp mills in Scandinavia are sold up for quite a period, and, because of the exchange uncertainty and the favorable price prospects, are inclined to wait before effecting further sales of their product. Some, it is reported, are sounding out buyers in the United States on payment for pulp on a crown basis instead of dollars; so far as is known, no mill abroad has as yet insisted on being paid in crowns, but there is a disposition manifest to alter the method of payment as a matter of protection for sellers abroad against possible exchange fluctuations and more particularly on contracts involving far-off shipments of pulp.

Demand recently has been chiefly for unbleached sulphite and kraft pulp, activity in bleached sulphate having lagged to some extent. One reason for the relatively quieter demand for bleached sulphite, it is stated, is that some consumers regard established prices on bleached sulphite as beyond a parity with unbleached sulphite prices, it being said that paper mills can purchase strong unbleached sulphite, bleach it themselves and effect a material saving in bleached pulp costs. The accuracy of this is refuted in some parts of the industry, though the fact remains bleached sulphite has been much slower marketwise than unbleached sulphite and kraft pulp.

Prime foreign bleached sulphite is quoted at 2.75 cents per pound upwards ex dock basis Atlantic seaboard, ranging up to 2.90 cents for ordinary prime grades, and some extra quality brands priced at 3 cents and higher. Strong prime unbleached sulphite is 2.10 to 2.20 cents a pound ex dock, easy bleaching and Mitscherlich sulphites 2.25 and 2.30 cents, and prime Swedish kraft pulp 1.85 to 1.90 cents. Scandinavian groundwood is quoted firmly at $28 or higher per short ton ex dock American Atlantic ports for dry pulp for forward shipment from abroad, and grinding mills are said to be reluctant to accept orders for the next couple of months owing to their sold-up condition.

Pulp imports into the United States during January were on a fair scale, totaling 124,911 long tons of chemical grades valued at $4,697,895, according to U. S. Department of Commerce figures, compared with 141,735 long tons of a declared value of $5,293,534 in the preceding month, and 124,081 tons of a value of $4,106,936 in the corresponding 1933 month. Thus, while the total volume of imports in January was practically the same as in the similar month a year ago, this year's importations showed an increase valuation, reflecting somewhat higher market prices obtaining as contrasted with last year. Groundwood imports in January amounted to 13,137 long tons, valued at $215,013, against 14,235 tons of a value of $246,546 in the month before, and 7,330 tons of a value of $134,859 in January a year ago.

### ◆ Paper

Paper imports into the United States in January showed a lower total value than in the preceding month but were above the value of January, 1933, receipts. According to U. S. Department of Commerce statistics, a total of $6,621,380 worth of paper of all kinds was imported in January last, compared with $7,081,375 in December last, and $5,925,682 in January a year ago. Newsprint, of course, comprised the great bulk of imports in January, standard newsprint to a value of $5,846,200 being imported in that month, contrasted with $5,414,995 in the same month last year. The next important class of paper imported was cigarette, January arrivals of which reached a value of $240,830, against $178,205 in January, 1933.

### ◆ Paper Stock

The United States imported 3,554,071 pounds of rags for papermaking, valued at $59,651, in January last, compared with 11,926,538 pounds of a value of $149,415 in the preceding month, and 5,486,097 pounds of a value of $45,994 in the similar month of 1933, according to U. S. Department of Commerce official figures. Imports of miscellaneous paper stock, including old rope, bagging, waste paper, etc., amounted to 4,437,334 pounds in January, valued at $74,937, against 7,751,567 pounds of a value of $110,760 in December last, and 5,389,773 pounds of a value of $57,856 in January, 1933.

## EXPORTS

Exports of paper and paper products from the United States during January were slightly lower in point of total value than in the preceding month but exceeded shipments in the same month last year, according to official U. S. Department of Commerce figures. The January exports reached a total value of $1,500,775, contrasted with shipments valued at $1,631,086 in the month before and $1,011,726 in January, 1933.

Exports of newsprint paper in January last amounted to 3,526,974 pounds, valued at $79,141, compared with 939,664 pounds of a value of $24,941 in the similar month of 1933. Uncoated book paper shipments in January were 1,497,669 pounds of a value of $77,766, against 957,096 pounds of a value of $45,598 in the same 1933 month. Wrapping paper exports in January were 4,052,996 pounds of a value of $150,945, against 2,463,137 pounds of a value of $100,910 in the similar month last year; exports of writing paper were 1,553,459 pounds of a value of $117,649, compared with 804,459 pounds of a value of $53,038, and of tissue and crepe paper 755,173 pounds of a value of $70,035, against 293,483 pounds of a value of $26,856. Exports of sheathing and building paper in January amounted to 597,086 pounds of a value of $13,134, compared with 541,448 pounds of a value of $14,760, and of toilet paper 595,123 pounds of a value of $50,637, against 293,483 pounds of a value of $26,856.

Exports of boxboard in January totaled 3,593,521 pounds, valued at $83,404, contrasted with 2,679,369 pounds of a value of $44,295 in the same month a year ago, while other paperboard exports amounted to 1,554,090 pounds of a value of $64,419, against 2,912,916 pounds of a value of $79,964. Exports of paper bags in January were valued at $53,731, compared with $43,949 in the same 1933 month, while shipments abroad of paper boxes and cartons were valued at $37,546, against $34,543 a year ago, and of envelopes $12,447, contrasted with $9,630 in January, 1933.

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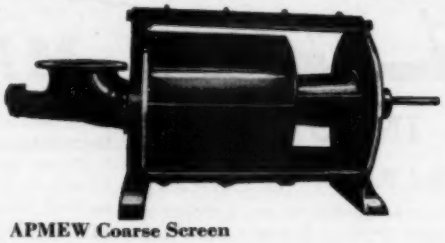

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